A TEXT-BOOK
ON
PRACTICAL OBSTETRICS

BY

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OF MEDICINE, OF THE NEW YORK OBSTETRICAL SOCIETY, ETC.

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PART I.—Pregnancy.

ANATOMY AND EMBRYOLOGY.

DIAGNOSIS, DIFFERENTIAL DIAGNOSIS, DURATION, AND HYGIENE OF PREGNANCY.

PATHOLOGY OF PREGNANCY.

DIAGNOSIS OF THE PRESENTATION AND OF THE POSITION OF THE FŒTUS.

CHAPTER II.

DIAGNOSIS, DIFFERENTIAL DIAGNOSIS, DURATION, AND HYGIENE OF PREGNANCY.

The signs or symptoms which lead to the diagnosis of pregnancy may be grouped under the headings of general and local, subjective and objective. Impregnation of the ovum affects the body in general as well as the reproductive organs in particular. The resulting train of general and of local symptoms must be separately studied and the weight of each must be properly appreciated in order to reach a diagnosis which rests on a basis of scientific exactitude.

The systemic and the local alterations will be separately studied, as far as is possible, in the order in which they may be first appreciable.

I. The Nausea and Vomiting of Pregnancy.—This sign of pregnancy often precedes the second sign,—amenorrhœa. It is a fairly constant accompaniment of pregnancy, although some women never suffer from it to any degree, whilst in others it is exaggerated to such an extent as to become an actual disease imperiling life. No satisfactory explanation for its occurrence has ever been offered, and we are obliged to rest content with the vague term "neurosis" as descriptive. Very frequently chronic constipation, the result of torpor of the intestinal tract, is at the bottom of the symptom; but then, again, it is a prominent symptom, although the intestinal canal is functionating after a normal fashion. In some women it is excited only by the sight of food or the smell; in others it occurs only in the morning on awakening and disappears on the ingestion of food; in rare instances, by a curious coincidence, the sign fails to appear at all in the woman, but is present in a marked degree in the husband. It is at once apparent that this sign can carry no weight in the estimation of the probable existence of pregnancy, being purely suggestive when associated with other symptoms.

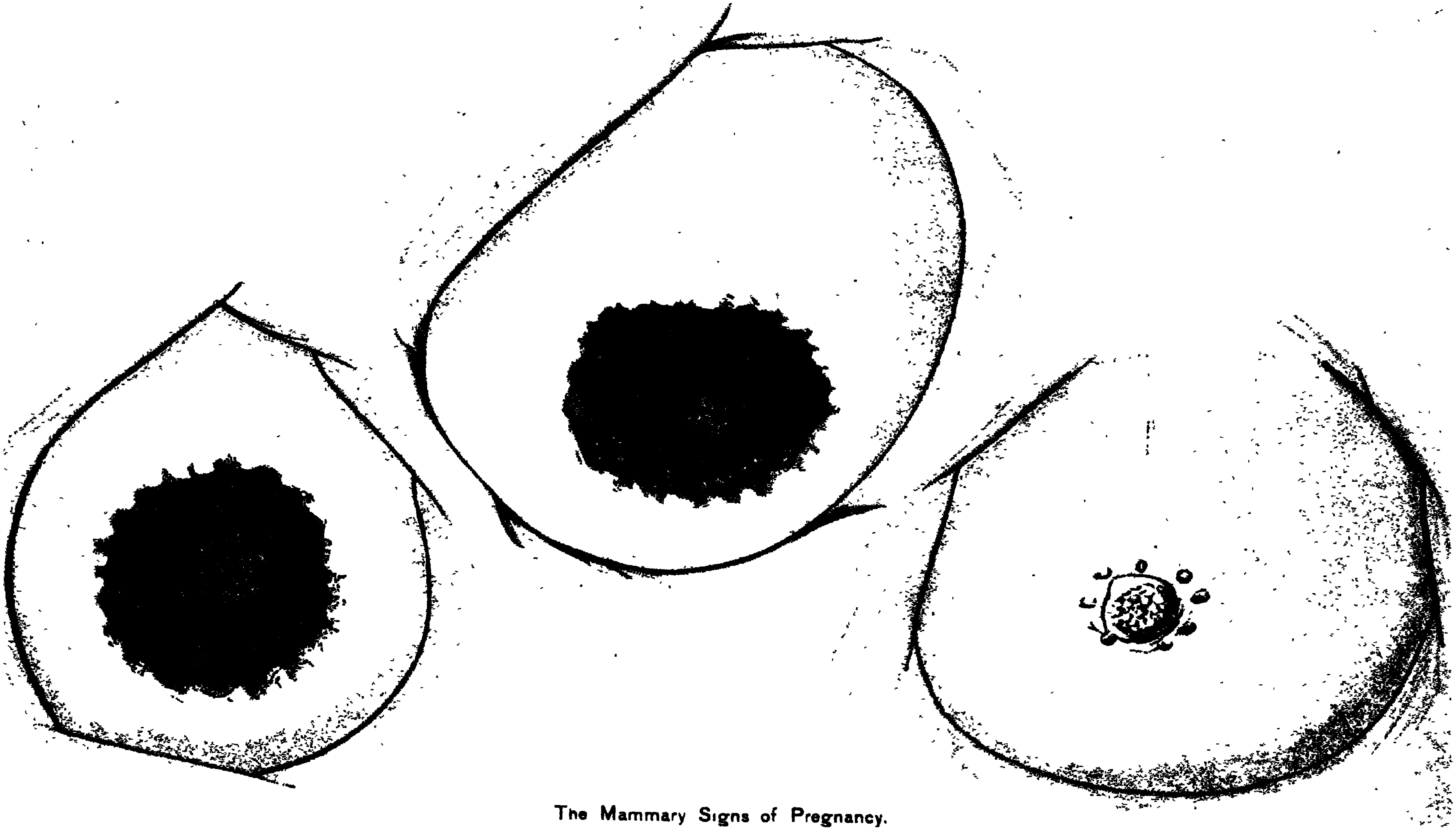
II. Amenorrhœa.—As a rule, the function of reproduction in woman is associated with that of menstruation. Therefore, in general, cessation of menstruation is one of the earliest signs of pregnancy. This rule, however, is subject to a number of exceptions. There are some women who never menstruate at all, and yet they conceive with considerable regularity. Witness the case of a woman who conceives during lactation, when usually menstruation is absent; witness, also, the exceedingly rare instances where there has never been present a red discharge, although there occur each month the general symptoms of menstruation,—the so-called *molimina.* Absence of menstruation, therefore, in women of this type may or may not mean the occurrence of conception. Whilst, also, the cessation of menstruation is a usual accompaniment of conception, other causes may arrest the function. Change of climate, mental impressions, exposure to cold, certain diatheses,—such as chlorosis, anæmia, or disease of the kidneys or lungs,—are affections which often are associated with absence of or irregular menstruation. Further still, in some women, notwithstanding the occurrence of pregnancy, there exists a periodical red discharge which simulates menstruation. This discharge may be due to the presence of a small cervical polyp or may be a transudation from the surface of an eroded cervix; whatever the cause, it introduces an element of uncertainty in the diagnosis. Suppression of menstruation is, therefore, a sign of little value except in case of women who have been previously regular and in whom the factors mentioned above are absent. Taken alone, this sign carries simply strong presumption. Too great care cannot be exercised not to allow this sign to swerve the judgment of the physician into the expression of a positive opinion; and, at the same time, the presence of this sign should always lead him into being exceedingly circumspect in making any intra-uterine treatment, particularly since absence of menstruation being associated in the lay mind with the presence of pregnancy, a woman who does not desire to bear children will unquestionably endeavor to deceive her physician by giving a false history of regular menstruation.

In connection with this subject of suppression of menstruation it must ever be remembered that the most dangerous affection to which woman is subject, if it be not recognized early,—ectopic gestation,—is associated with irregular hæmorrhages at the stage when, above all others, it is necessary that a correct diagnosis should be made in order that the proper surgical treatment may be instituted.

III. Quickening.—Quickening, or the sensation of fœtal motion, is a sign of considerable value when taken in conjunction with others. It is, however, of greater value in enabling us to predict the probable period of gestation than as assisting us in reaching a diagnosis of pregnancy. Many women hardly are conscious of the motion of the fœtus until other very positive signs of pregnancy exist; other women, in their anxiety for children, feel this sign when they are not pregnant, or deceive themselves into the belief that they feel motion long before it is likely they could. The time of the appearance of the first sensation of fœtal movement is rather variable. As a rule, the sixteenth week is the date, although some women are affected earlier and others much later. The sign is described as a "flutter" in the abdomen, and is believed to be due to the first contact of the enlarged uterus with the abdominal wall. The fact that the sign is felt so much earlier by some women and so much later by others would seem to disprove this idea. The preferable explanation is that which looks to the transference by nerve-impulse of the motion of the fœtus. As gestation advances these motions become more and more active, although varying in character in different women. This sign is likely to be simulated by the motion of gas in the intestinal canal, and in women of a highly nervous organization the belief in the existence of pregnancy, although absent, may become firmly established, especially if other supposed symptoms concur, giving rise to the occurrence of that peculiar neurotic condition to which the term "pseudocyesis" has been applied. Sudden cessation of fœtal movements is often coincident with death of the fœtus, although there are scores of cases recorded where healthy children have been born even after motion has not been appreciated for months or never felt. The sensation of motion, therefore, by the woman carries only relative value as a sign of pregnancy. When felt by the physician the case, as will be noted, is different. There is nothing which is likely to simulate the motion of the fœtus to the hand of an expert. Neither contraction of the abdominal muscles, nor the movement of gas in the intestines, nor a wandering kidney,—which, by the way, frequently imposes on the woman,—can yield to the hand of the unprejudiced observer the sensation of the moving fœtus. It must be remembered, however, that there are conditions—such as excess of liquor amnii—which will interfere with the perception of these movements by the physician, and, in excessive cases, by the woman.

IV. Mammary Signs.—Changes in the breasts are among the earliest signs of pregnancy. In many women the breasts become painful and enlarge within a fortnight of the occurrence of conception. As a rule, however, the characteristic changes do not occur until a much later date. About the end of the eighth week the nipples swell, become erectile, deepen in color, and their sensibility is increased. Frequently even as early as the twelfth week a drop or so of colostrum may be expressed from the breasts. The sebaceous glands of the nipples increase in size, appearing as papules above the level of the skin. The areola of the nipples takes on a deeper hue, this phenomenon being especially marked in brunettes. About the twentieth week a secondary areola is formed outside of the margin of the primary, this again being especially marked in brunettes. (Plate II, A.) As gestation advances these changes in the breasts become intensified, the surface being traced with bluish vessels and the glands becoming not only larger, but also more painful. These changes may be traced to the intimate sympathy which exists between the genitalia and the mammary glands. Therefore, the breast signs described are, early in pregnancy, only of relative value as a means of diagnosis. In women

PLATE I.



The Mammary Signs of Pregnancy.

of an erotic temperament these same signs are not of uncommon occurrence aside from pregnancy, particularly at the menstrual period, and, again, disease of the uterus or of the ovaries is often associated with the same signs. The mammary signs are, perhaps, of greater value in primiparæ than in multiparæ, certainly at an early stage of pregnancy. The negative value of the signs is, at this date, of greater value than the positive. Absence of the signs entirely is strong presumptive evidence of absence of pregnancy. (Plate I.)

V. Vaginal Signs.—Of considerable presumptive value of pregnancy is the bluish discoloration of the vagina, or, rather, of the urethral bulb. This sign is an early one, being appreciable at about the sixth week. It is due not alone to venous congestion, but also to the actual increase in size of the venous radicles which exist in this locality. As pregnancy advances this discoloration increases, in certain instances the color being almost black, when, however, marked varices are present. This discoloration of the urethral bulb may also be noted in connection with other causes of vaginal congestion, such as marked prolapse of the uterus or impacted fibroid growth; but then other symptoms characteristic of pregnancy will be absent. The sign altogether is of considerable presumptive value in connection with other signs, particularly in the nullipara.

VI. Cervical Signs.—At a very early date of pregnancy the cervix, on inspection, has a similar bluish tint to that just dwelt upon as present at the urethral bulb. The characteristic change in the cervix, however, which should always suggest the existence of pregnancy, is the so-called softening, which is the natural result of the congestion of the cervical tissues associated with the presence of pregnancy. This softening, it should be noted, is in the substance of the tissues, and not alone at the tip of the organ. Sensation of softening at the tip may be due solely to an erosion of the epithelium; softening in substance is very different and not alone yields a different sensation to the examining finger, but on inspection the cervix is found intact as regards its epithelial layer. This change in the cervix is necessarily most marked in nulliparæ. In the multipara the cicatricial tissue left by lesion sustained at a previous delivery obscures, to a greater or a less degree, the softening. As a rule, it may be stated that this softening in substance of the cervix is a very valuable sign of the existence of pregnancy. Pathological changes in the cervix due to the presence of cancer will alone, in a primipara, prevent the softening. In conjunction with other signs dwelt upon,—the nausea, the suppression of the menses, and the mammary changes,—this softening may be taken as strong presumptive evidence of impregnation.

VII. Uterine Signs.—Within four weeks after conception the uterus begins to assume the shape which is characteristic of pregnancy. This is especially true of the organ which has never been impregnated. The organ loses its pyriform shape and assumes that of a flattened sphere. The implantation of the fecundated ovum in the uterus is associated with an increase in the blood-supply; the uterus, becoming heavier, sinks in the pelvis; the organ develops more in its transverse diameters than in the longitudinal. Even before the changes in the cervix become at all marked, even before the subjective symptoms—the nausea and vomiting—and the mammary signs become pronounced, the uterus of the nullipara presents the following characteristic alterations as regards the body: The shape is that of a flattened sphere; the lower uterine segment—that is to say, the portion of the body of the uterus just above the vaginal reflexion—juts over the cervix. On combined abdomino-vaginal examination the body of the uterus, whilst spherical in outline, seems to be compressible. This compressibility is especially marked if the internal finger, either in the vagina or in the rectum, is applied just above the reflexion of the vagina from the cervix. Obviously the determination of this early change in the body of the uterus will depend on the ease with which it is possible to make the conjoined examination. It is particularly in women who are not especially stout that the sign will be determined with the greatest ease. As pregnancy advances—that is to say, from the sixth week on—the characteristics which have been noted become intensified, until, at the eighth to the tenth week, these changes in the body of the uterus are sufficient, in women of lax abdominal walls and in nulliparæ, to render the diagnosis of pregnancy strongly presumptive. The evidence, it must be remembered, is not sufficient to justify the physician in giving an opinion at all positive; but in his own mind there will remain little doubt as to the correctness of the diagnosis, which, if the woman be examined after the lapse of a week, will be certified in the event of the changes having become intensified, for, if the woman be pregnant, these changes become more marked as gestation progresses, until other signs of pregnancy of a more positive nature appear.

The conditions likely to simulate these changes are so-called chronic metritis and uterine fibroid. In neither of these conditions, however, is the uterus spherical in shape or compressible, nor does the lower uterine segment jut over the cervix with that doughy consistency which is associated with early gestation. Indeed, at the period when this sign is most marked—about the tenth week—the coexistence of the other early signs we have dwelt upon forms a very strong justification of the diagnosis of pregnancy; certainly the weight of evidence will be in favor of such assumption.

VIII. Abdominal Signs.—At an early period of gestation, beginning with about the twelfth week, the linea alba becomes darkened, the color deepening as gestation advances, and the change being most marked in brunettes. About the twelfth week the abdomen itself begins to enlarge, for it is about this time, in women with normal pelves, that the uterine tumor reaches the level of the pelvic brim. From this time on, abdominal palpation and conjoined abdomino-vaginal examination reveal signs of considerable value in reaching a diagnosis of pregnancy. From the eighth week on the gravid uterus contracts rhythmically, giving us the sign known after Braxton-Hicks, who first called attention to it. These intermittent uterine contractions may be obtained, in women with lax abdominal walls, by elevating the uterus on the finger inserted into the vagina, and by grasping and gently rubbing the body of the uterus through the abdominal walls. The uterine tumor will be found to harden and to relax at intervals. Of course, as gestation progresses these intermittent uterine contractions become more marked, but their especial diagnostic value is between the eighth and the twelfth weeks of pregnancy. About the fourth month, when the uterus has risen above the pelvic brim, conjoined manipulation through the abdominal walls will elicit contractions. The only conditions which are likely to simulate these contractions are myomata of the uterus, hæmatometra, and a distended bladder. The history and the shape of the uterus should suffice to differentiate the former conditions, and the catheter will eliminate the last.

Whilst intermittent uterine contractions are not alone sufficient to justify a diagnosis of pregnancy, the sign must be considered a very valuable corroborative one. It is never absent when the uterus contains a product of conception, and if it be absent there will not be present other presumptive signs of pregnancy. Another sign to be secured through the abdomen is *ballottement*,—the term given to the motion imparted to the fœtus when one or the other of its extremities are struck, the other portion impacting at the opposite side of the abdominal wall. Ballottement may be either direct abdominal or combined abdomino-vaginal. Vaginal ballottement is secured to best advantage when the woman stands erect; but ordinarily this sign, when needed for diagnosis, can be obtained with the woman in the recumbent posture, which should always be chosen when feasible, since the innate modesty of the woman is thus better protected.

To obtain vaginal ballottement the woman stands in front of the physician, her legs separated slightly, and the physician inserts one finger into the vagina, depressing, or rather pushing, the perineum backward as much as possible, in order to reach as high up as is necessary. This intravaginal finger is placed in the anterior or the posterior fornix of the vagina and a sharp upward impulse is given, the result of which is, in case the uterus contains a fœtus floating in the liquor amnii, that this fœtus is displaced upward and falls back on the finger.

To obtain abdominal ballottement the woman lies on her bed or couch, the abdomen being covered by a sheet. The bladder should be empty. The physician determines by palpation a point of resistance in the uterine tumor, and gives a sharp impulse here, his other hand lying flat on the abdomen at the opposite pole. The fœtus is thus dislodged in the liquor amnii and the impulse is received on the flat hand. A necessary precaution prior to this manipulation is that the hands should be warmed and that the uterus should not be manipulated over-much, otherwise the organ will contract on its contents and ballottement can only be obtained during uterine relaxation.

Ballottement is hardly available before the fourth month, because, prior to this date, the fœtus is too small and the amount of liquor amnii present too slight to allow of motion to a sufficient extent. From the fourth month on to the eighth the sign may be obtained, but after the eighth month, or earlier in case of very large fœtus or of deficiency in liquor amnii, the sign is not obtainable, because the fœtus is too large to be made to float. As a diagnostic factor this sign, however, is chiefly of value between the fourth and sixth months of pregnancy, for after this latter date the fœtal heart may be heard, which alone certifies to the presence of pregnancy.

It must never be forgotten that the presence of ballottement simply certifies to the fact that there is something which floats in the uterus. This is no proof that a live fœtus exists, and the absence of ballottement is no proof that the woman is not pregnant, since, as already stated, there are conditions under which the sign cannot be obtained, although the woman is pregnant. There are, further, certain sources of error which must be borne in mind. A movable stone in the bladder may give the impulse to the vaginal finger which the fœtus does; a pediculated subperitoneal fibroid, or an ovarian cystoma, or a wandering kidney may each simulate ballotement. Care in securing the history of the patient, however, which will reveal symptoms suggestive of the presence of one or another of these conditions and the absence of certain of the symptoms peculiar to the stage of gestation which the woman has supposedly attained, ought to prevent error. Fortunately, at the period when ballottement may be secured to best advantage other symptoms of pregnancy of far greater weight are present.

Palpation of the abdomen affords information of considerable value toward the diagnosis of pregnancy. The outline of the uterus may thus be mapped out; its height above the pelvic brim may be estimated; the presence of one or more points of greater resistance may be determined, leading at times, perhaps, to the suspicion of multiple pregnancy; the presence of a complicating tumor in addition to the uterine. Such are certain of the factors which careful palpation may reveal. We would again lay stress on the fact that manipulation should be gentle, else, after the fifth month of gestation, the uterus, if gravid, will inevitably contract and defeat the aim of the manipulation.

Later on, under the head of "Abdominal Palpation," will be described the information to be secured in reference to the position of the fœtus in the uterus.

The most important information obtainable through the abdominal walls is the fœtal heart-sounds, which constitute alone a diagnostic sign of pregnancy; indeed, this is the sole sign which will enable the physician to certify to the existence of gestation in a court of law. Other signs together furnish strong presumptive evidence amounting practically to a certainty, but they are one and all liable to erroneous interpretation with the exception of the sounds of the heart.

Whilst it has been claimed that the fœtal heart-sounds may be heard as early as the sixteenth week, and whilst certain observers have noted them even as early as the twelfth week, as a rule they are not discernible until the twentieth week, and then only under exceptionally favorable circumstances, such as very thin abdominal walls and close apposition of the uterine parietes to the abdomen. From the twenty-fourth week on, these sounds should always be obtained in case the fœtus is alive, although their absence will not certify to fœtal death, since, in instances of hydramnios or in cases of thick abdominal parietes, the sounds may not be able to penetrate to the ear.

The quality of the heart-sounds has been likened to the ticking of a watch under a pillow, but the student may best familiarize himself with this quality by listening frequently to the heart-beats of a newborn child, remembering that the sounds when heard through the abdominal walls are necessarily somewhat fainter.

In listening for the heart-sounds the maternal pulse should always be noted coincidently, for thus a possible source of error—that of mistaking the communicated sound of the maternal pulse—will be avoided. The rapidity of the fœtal heart varies exceedingly, the average being about 130. This rate differs, however, within physiological limits, being dependent in a measure on the condition of the woman, and, possibly, also on the active or passive state of the child.

Whilst it has been asserted that there is a difference in the fœtal heart-beats in the male and the female, the latter being more rapid than the former, and whilst repeated attempts have been made to predict the sex of the fœtus according to the rapidity of the beats, the result of such attempts has been failure as well as success in about the same ratio. It is probable that a large female fœtus has a slower pulse than a small male, and *vice versâ*, although any prediction as to the sex of the fœtus must be considered as guess-work. This is as would be expected when it is borne in mind that the pulsations of the fœtal heart are intimately dependent on the maternal condition, and that, therefore, the rapidity of the beats may vary not alone from day to day, but also from hour to hour.

Auscultation for the determination of the fœtal heart-sounds may be mediate or immediate through the abdominal walls. The attempts which have been made to popularize auscultation through the vagina have very properly failed, not only because the desired information can be secured to better advantage through the abdomen, but also because vaginal auscultation is bound to be repugnant to the woman; and, in the absence of decided advantages, it should therefore not be resorted to.

According to individual taste, auscultation may be practiced through the stethoscope or by direct application of the ear to the abdominal wall. In either event the woman should lie on the bed or couch, the abdomen covered by a thin sheet. Absolute quiet of the woman and her surroundings is requisite, since, whilst often the sounds are very loud, again they may be exceedingly faint. At an early stage of gestation the sounds are necessarily to be sought over the fundus of the uterus in the midline; later, as the uterus rises high above the pelvic brim, the entire anterior wall of the organ may be explored. After the sixth month, as a rule, the outline of the fœtus may be mapped out, and then the area within which the sounds should be heard to best advantage is circumscribed according to the presentation of the fœtus. It has been established that the fœtal heart occupies a position about equidistant between its cephalic and pelvic poles, and, therefore, where the pelvic extremity of the fœtus occupies the lower portion of the uterus the sounds will be heard higher up than when the head of the fœtus is the lowest part of the fœtal ovoid. Thus, in breech presentations the fœtal heart-sounds are heard above the umbilicus, and in vertex presentations they are heard below. This statement presupposes a normal pelvis, however; for, otherwise, neither presenting pole can engage as deeply; and, therefore, the point where the sounds are best obtainable will vary.

As will be noted in the proper place, the site of maximum intensity of the heart-sounds is of considerable value in the diagnosis of position of the fœtus. The hearing of two sounds varying in rhythm and at different points of the abdomen, especially if repeated examinations give the same result, is strong presumptive evidence of twin gestation.

As we have noted, the only condition which will simulate the fœtal heart-sounds is the maternal arterial beat transmitted through the abdominal walls. Counting the pulsations will, as a rule, clear the diagnosis unless the woman be suffering from some affection associated with rise of temperature, in which case the increased rapidity of her heart-sounds will, of necessity, render it difficult to differentiate.

Distinct recognition of the fœtal heart-sounds is positive evidence of the presence of pregnancy. Absence of the fœtal heart-sounds does not negative pregnancy, since the fœtus may be dead. When, on repeated examination, the fœtal heart-sounds are found to be growing weaker and altering in frequency, the assumption is strong that fœtal death is imminent, in which case, if gestation has advanced far enough to be compatible with extra-uterine existence, the induction of premature labor, in the interests of the child, might seem desirable.

Aside from the fœtal heart-sounds auscultation reveals other sounds which, while not diagnostic of pregnancy, are associates of the condition. These sounds are known as the funic souffle and the uterine bruit. The funic souffle is so termed because it is considered to emanate from the umbilical cord. It is synchronous with the heart-sounds, and occasionally is so loud as to obscure these. This sign is not constant; indeed, according to some investigators it is heard in only 20 per cent. of the examined cases. Its value, therefore, from a diagnostic stand-point, of the existence of gestation is very slight. The uterine bruit was formerly termed the placental murmur, being supposed to originate in the vessels of the placenta. Modern investigation, however, has disproved this view, since this sound persists in many instances for days after the delivery of the placenta. The sound is a blowing one, synchronous with the maternal heart, and varies markedly both in quality and in intensity. The sound is apt to be intermittent, disappearing at the height of a uterine contraction. The generally-accepted view to-day is that the sound is produced in the uterine vessels, and proof of this would seem to be the fact that a similar souffle may often be detected in connection with uterine myomata of a very vascular character. This sound is hardly appreciated through the abdominal walls until the fourth month, but it may be detected through the vagina at an earlier period. Its value as diagnostic of pregnancy is only relative, since, as we have noted, it accompanies other conditions.

DETERMINATION OF THE PERIOD OF GESTATION.

Whilst variable within limits, in appearance these signs of pregnancy may be conveniently grouped together as characteristic of stages of gestation. The evidence on which a diagnosis of pregnancy should be based is rarely positive up to the time when the fœtal heart may be heard, and yet the concurrence of certain symptoms at a given period will furnish strong presumptive proof of pregnancy.

During the first three months of pregnancy its existence may be reasonably predicated by the presence of the following symptoms: Suppression of the menstrual discharge in a woman previously regular, associated with nausea or vomiting in the morning, should always awaken suspicion. On examination during this period we shall find, after the first menstrual period has been skipped, bluish discoloration of the urethral bulb, and a uterus lower in the pelvis than under normal conditions we should expect to find it. The cervix usually will present a sensation of softness to the touch, and the circular arteries will pulsate markedly. At about the sixth week, the body of the uterus will have assumed a spherical shape and the lower uterine segment will project over the cervix. On inspection of the breasts, if the woman be a brunette, the primary areola will be noticed and a few sebaceous follicles will be prominent. About the eighth week the changes in the body of the uterus become more marked and the entire tip of the cervix yields, to the touch, that softening in structure which is characteristic. At the tenth week the outline of the uterus is distinctly spherical, the bogginess of the lower uterine segment and its projection over the cervix are very pronounced, the nausea and vomiting are ordinarily not so marked, the mammary signs are intensified, and the violet hue of the vagina is deeper.

These characteristics are not sufficient to justify the physician in making a diagnosis of pregnancy, although the presumption in a woman who has never borne children is a very strong one. All the signs noted may be present as the result of other conditions, except, possibly, the peculiar configuration of the lower uterine segment, although it would be unusual for this group of symptoms to coexist in a pronounced degree if the woman were not pregnant. From the twelfth to the sixteenth week the nausea and vomiting usually disappear, although in some women it remains throughout gestation; the mammary signs become more pronounced; the cervical signs and those of the lower uterine segment are very characteristic; the uterus rises to the pelvic brim; and the abdomen begins to round out. About the sixteenth week, a trifle earlier in some women and later in others, the first fœtal motion is appreciated by the woman; at times, on conjoined abdomino-vaginal examination, the intermittent contractions of the uterus may be evoked. At the twentieth week, where the pelvic brim is not contracted, the uterus may be palpated through the abdominal walls midway between the symphysis and the umbilicus; in case the pelvic brim is contracted the uterus will be found at a higher level. When thus palpated the uterus will have the distinctively spherical shape of pregnancy; it will contract rhythmically on manipulation; in excessively rare instances the beating of the fœtal heart may be heard. Usually, vaginal ballottement may be secured. At this date, the twentieth week, the physician, as a rule, possesses sufficient evidence on which to base a diagnosis of pregnancy, but his opinion must be guarded, for even yet there are sources of error.

From the twenty-fourth to the thirty-second week the diagnostic signs become rapidly more pronounced. The uterus reaches the level of the umbilicus about the twenty-eighth week, its spherical outline being very marked; the cervix is softened throughout one-half its extent; the passive motions of the fœtus are intensified and may be evoked by the physician; abdominal ballottement may readily be obtained; the uterine souffle is distinct and the fœtal heart may ordinarily be heard.

We have attained, then, the period when the diagnosis of pregnancy may be certified. Even without the positive evidence afforded by the fœtal heart, the signs are distinct enough, if weighed in connection with the past history, to justify a diagnosis of pregnancy. Of course, the data are not perfect without the fœtal heart, but it must be borne in mind that the woman may be pregnant without the heart-sounds being appreciable, and, further, that the fœtus may be dead.

The evidence in our possession simply becomes stronger from the thirty-second week on to term,—the fortieth week. In women with thin abdominal parietes the parts of the fœtus may be palpated, and, if the fœtus be alive, the movements are such as can be simulated by nothing else. The motion of gas in the intestines may lead the woman astray, but the sensation of motion communicated to the palpating hand is unmistakable. On vaginal examination the cervix will be found to be gradually becoming merged in the lower uterine segment, and the presenting part of the fœtus may be felt in the anterior fornix of the vagina, except where the placenta is implanted below.

During this period—the thirty-second to the fortieth week—the changes in the cervix are very characteristic. The vaginal portion softens very rapidly, until, in primiparæ, at the end of gestation the cervix has become merged entirely in the lower uterine segment.

About the thirty-eighth week the uterus begins to sink gradually in the pelvis, attaining, in normal pelves, the height it should occupy about the eighth month of pregnancy. This sinking is due to the attempt at engagement of the presenting part in the pelvic inlet, and normal sinking may be taken as a sign that the inlet is not contracted. The respiration of the woman is easier on account of the lessened pressure on the diaphragm associated with the sinking, but the œdema of the lower extremities and of the external genitals is proportionately increased. These various symptoms are chiefly of value as indicating that labor is about to set in, although they are all corroborative of the ascertained diagnosis of pregnancy.

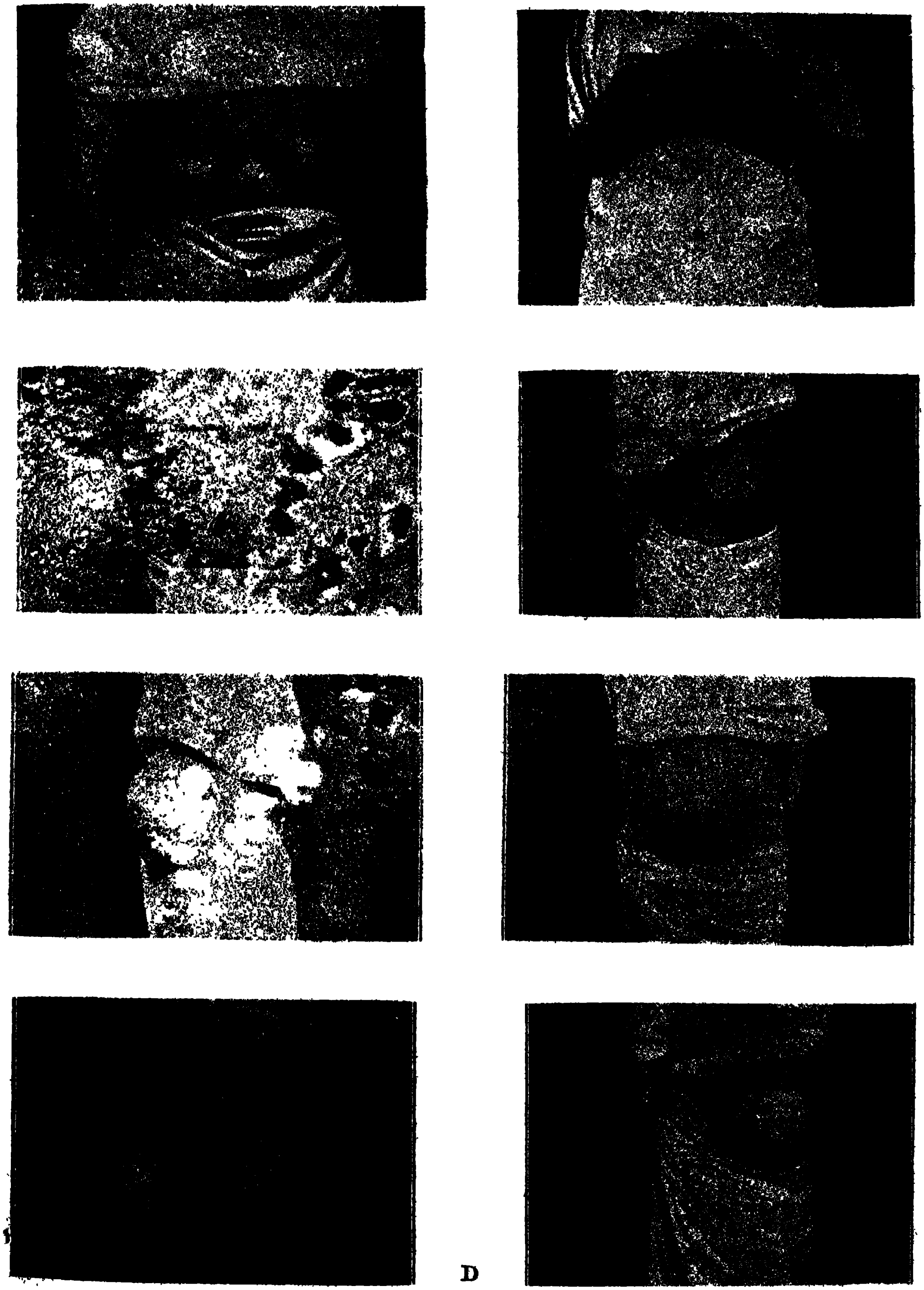
DURATION OF PREGNANCY AND THE PREDICTION OF THE PROBABLE DATE OF LABOR.

The average duration of pregnancy in the human female is ten lunar months, or forty weeks, or 280 days from the beginning of the last menstrual period. This duration, however, varies within wide limits, since it is impossible to determine the exact date of conception, and since ova are shed not alone after and before a menstrual period, but also in the interval between two periods. In certain cases gestation seems to be prolonged less than this approximate period, and in others far beyond. Under the old French law the legitimacy of a child could be disputed which was born 300 days after the death of the father; in Austria 240 and 307 days are recognized as the early and the late limits of legitimacy; in England and in the United States we rightly find no dogmatic statement as to legitimacy, the fact of protracted gestation being admitted by the law. There are many undoubted instances of protraction of pregnancy beyond the 320th day after the supposed conception.

In predicting the date of probable delivery we are met, at the outset, by the difficulty that it is not possible to determine the time when fruitful coition occurred. The data which have been obtained from a large number of cases where it was ascertained with a sufficient degree of certainty that there had been but one coitus, at which time conception had necessarily occurred, has enabled us to fix the average period of gestation as being about two hundred and eighty days. Even in such instances, however, there is a margin of error of a fortnight, because the spermatozoa are capable of life to this extent, and even beyond this in the normal secretions; and, furthermore, at the time of coitus there may be present no ovum ready to be fertilized, even though the woman has but just menstruated, or none of the ova shed at this period may be fertilized, the spermatozoa awaiting the shedding of later ova. We have, hence, ground for error varying between a fortnight and a lunar month. These facts go far toward explaining instances of protracted gestation. For similar reasons the date of the last menstrual period is open to erroneous interpretation. The woman may conceive either just before the period which failed to appear, or just after that which did appear, or in the intermenstrual interval. Here, again, there is ground for error within from two weeks to a lunar month. Quickening does not furnish a reliable guide, for the reason that the period when this is first felt varies within the limits of a month; and then again many women are not conscious of the first movements of the fœtus or are deceived by the motion of gas, for instance, in the intestines, into the belief that life is present, or rather is felt, far earlier than it is at all likely it could be. The height of the uterus above the pelvic brim, although fairly constant under normal conditions at different periods of pregnancy, is not reliable as a means of predicting the probable date of labor, because this height is subject to considerable variation according to the capacity of the pelvic basin, the condition of the neighboring viscera, and according to the size of the fœtus and the amount of liquor amnii present. Still, it offers an approximate guide for the estimation of the period which pregnancy has attained This statement holds true only for the pelvis in which the pelvic inlet is of the normal type. In case of the contracted brim the uterus as it enlarges cannot sink to the same degree; so that it will be always higher above the brim than under normal conditions. At the third month the uterus approaches the brim; at the fourth month it is about on a level with the brim; at the fifth month it is situated midway between the pelvic symphysis and the umbilicus; at the sixth month it attains the level of the umbilicus; at the seventh month it rests about two fingers' breadth above the umbilicus; at the eighth month it reaches midway above the umbilicus; at the ninth month it reaches the ensiform cartilage and gradually sinks until at term it occupies the position which it did at the end of the eighth month.

When viewed in outline the abdomen has the shapes which are shown in the plates at given periods of pregnancy. (Plate II, B, C, and D.) Of course, extreme laxity of the abdominal parietes

PLATE II.



A. The Primary and Secondary Areolæ.
B. Outlines of Abdomen at Fifth Month of Pregnancy.
C. Outlines of Abdomen at Seventh Month of Pregnancy.
D. Outlines of Abdomen at Ninth Month of Pregnancy.

or the deposit of a large amount of fat in the walls of the abdomen interferes with the usual outline appearance.

Certain observers—the late Karl Braun, for instance—laid considerable stress on the estimated length and weight of the fœtus, the methods for determining which are given in the portion of this work devoted to obstetric surgery; but at best, even here, there are elements of error aside from the problematical nature of evidence as to weight and length of a body which can be measured only after an exceedingly indirect manner.

Our argument goes to show how much open to error is the statement of the probable date of delivery, and, as is noted in "Obstetric Surgery," this is very unfortunate when it is desired, for one or another reason, to induce premature labor without imperiling unduly the chances of fœtal viability. A generally accepted rule, and one which enables us to approximate the date of delivery within from one to two weeks, is the following: Having determined the date of the last menstrual period, add seven to fourteen days, according to the usual protraction of the menstrual period in the given individual, and count forward nine calendar months, or, what amounts to the same thing and is more convenient, count back three months. We shall thus, in the average case, come within a week of the correct time, which will be found to vary between 275 and 280 days from the last menstrual period. Even under this rule there is an element of great uncertainty, for many women have an apparent menstrual flow for one or more periods after they have conceived. In such cases the height of the uterus and the ascertained date of quickening will be found not to correspond with the date of apparent conception.

A further element of error on which we must dwell, although the theory on which it is based is as yet not proved within the limits of scientific exactitude, is the contention that during the fruitful life of woman she is constantly engaged in preparing her sexual organs for insemination. The menstrual period is looked upon as an act which cleanses the system of the products which have been laid up during the intermenstrual period for the nourishment of the ovum in the event of its becoming inseminated. Now, in some women the duration of this cycle is less than in others. For instance, in certain women in every respect healthy the menstrual period anticipates the lunar cycle,—that is to say, recurs every 21 instead of every 28 days, whilst in other women the cycle is uniformly prolonged beyond 28 days. If then labor should occur, as has been claimed, at or near what would have been a menstrual epoch had the woman not conceived, in many women the duration of gestation will be about 270 days, and in others nearer 300 days instead of about 280. It is apparent, therefore, that the physician, in order to avoid an exceedingly wide margin of error, should not rest content with the determination of the menstrual date, as regards the last beginning or cessation, but should also question his patient as to the ordinary recurrence of the flow, and make due allowance for this before giving an opinion.

A fairly reliable point in regard to impending labor may be secured by the determination of the date of sinking of the uterus. As we have stated, the uterus sinks into the pelvic brim, under normal conditions, about two weeks before labor. At a late date of pregnancy, also, the changes in the vaginal portion of the cervix give a fairly reliable guide. So long, in primiparæ, as this portion of the cervix remains unmerged in the lower uterine segment, labor is not likely to occur unless it should do so prematurely.

DIFFERENTIAL DIAGNOSIS OF PREGNANCY.

Whilst the diagnosis of pregnancy, under normal conditions, may frequently be reasonably predicated even before the absolute sign, the fœtal heart-sound, is discernible, often it is an exceedingly difficult matter to attain a positive diagnosis. In neurotic women, especially at the time of the menopause, all the rational signs of pregnancy may be present, associated with increasing abdominal enlargement. These women are either exceedingly anxious to bear a child or else they have subjected themselves to the risk of conception apart from the married state. Such women give a clear history of the early signs of pregnancy,—the amenorrhœa, the nausea and vomiting, the enlargement of the breasts and of the abdomen, the sensation of fœtal motion; they are not trying to deceive the physician, but are deceiving themselves. Numerous instances are on record where they have made every preparation for the impending labor, and many cases are also on record where the physician has been himself a party to the deceit. To this condition the term "pseudocyesis" has been applied, meaning false pregnancy. A careful estimation of the symptoms and an equally careful local and combined examination should serve to convince the physician of the true state of affairs. If the uterus can be grasped bimanually, it will always be found much smaller than the supposed date of pregnancy, and it will always lack the peculiar shape to which allusion has been made. The cervical alterations will never be present, and on auscultation the characteristic sounds will never be heard. If the woman is too stout to allow of bimanual examination, or if the accumulation of gas in the intestinal tract is too great to enable the external hand to properly depress the abdominal wall, then at times the symptomatology is marked enough to call for anæsthesia to determine the true state of affairs.

The persistence of an apparent periodical menstrual discharge during the early months of pregnancy, and at times throughout gestation, is by no means uncommon, and this will tend to render the diagnosis of pregnancy difficult. The question of differential diagnosis here may usually be settled by careful local examination. A submucous cervical polyp may be at the bottom of the discharge, and on its removal the anomalous symptom ceases. Hæmorrhage, however, during pregnancy is not so important as casting doubt on the existence of the condition as it is a signal of a pathological condition associated with the pregnancy. Local examination should always be resorted to, since early malignant disease of the cervix may be the causal factor, or the placenta may be implanted in the lower uterine segment, both of which conditions the welfare of the woman requires should be detected early. It should be remembered, also, that hæmorrhoids or polyp or malignant disease of the rectum may give rise to hæmorrhages, and that in an obscure case the lower bowel should be examined. The mistakes made by eminent men should serve as a warning never to rest satisfied with a superficial examination.

Long-standing congestion of the pelvic organs may lead to the presence of many of the early symptoms of pregnancy. The nausea and vomiting, the bluish discoloration of the vagina, the enlargement of the uterus, the apparent softening of the cervix, the enlargement of the abdomen, the mammary signs,—all these symptoms may exist and yet pregnancy be absent. Here, again, careful examination and a proper appreciation of the signs should serve to guard against error in diagnosis. The uterus will never be found to have the spherical outline which may be determined even at a very early stage of gestation in the nullipara, and with less exactitude in the pluripara. The apparent softening of the cervix will, on inspection, be found dependent on an erosion of the epithelial layer of the cervix, the result of acrid discharge from the uterus; the enlargement of the abdomen may be determined as due to the constipation which is such a frequent associate of pelvic congestion; the sensation of fœtal motion will be determined as due to the presence of flatus in the intestines.

Fibroid tumors of the uterus may at times render the diagnosis of pregnancy difficult. This will especially be the case in women with a large amount of adipose in the abdominal walls. Whenever careful bimanual examination is possible, however, the differential diagnosis ought not to present difficulties. The cervical signs of pregnancy are absent; the uterine outline is not apt to be spherical unless the fibroid is symmetrical, and then the consistency of the uterus is harder than in pregnancy, and, instead of amenorrhœa, the menstrual flow is either natural and regular or else there is a history of hæmorrhages. The rational signs of pregnancy will rarely be present,—after a suggestive manner, if at all. If the fibroid be subperitoneal, on careful palpation the tumor will be found independent of the uterus or projecting in a nodular fashion from it. Of course, the two conditions, fibroid and pregnancy, may coexist, and then the differential diagnosis may be difficult; but the after-course of events will, very shortly, on renewed examination clear the diagnosis. It is, in particular, fibroids inserted in the lower uterine segment which are likely to obscure diagnosis, and this for the reason that their presence interferes with careful bimanual examination. In these cases the combined abdomino-rectal examination will be found serviceable, as enabling us to map out the outline of the uterus, and perhaps to obtain ballottement. When the fibroid is large, occupying perhaps the entire abdominal cavity, it will frequently be no simple matter to exclude a complicating pregnancy. The inability to hear the fœtal heart-sounds offers the strongest corroborative evidence, however, although it must be remembered that, owing to the position of the fœtus or of the complicating tumor, this sound might not be transmitted to the ear. Very seldom, however, will the grouping of symptoms give us preponderating evidence of the existence of gestation in its absence, when the symptoms of fibroids are marked.

Large ovarian cysts, filling the abdominal cavity, are hardly likely to simulate gestation. The early history of pregnancy will be lacking; the enlargement of the abdomen, usually, will have been slower; the percussion outline of the tumor will not yield the spherical shape of the gravid uterus; the intermittent uterine contractions will be absent, and it will not be possible to obtain the fœtal heart-sounds. The facies of the woman, again, is utterly different, that which is associated with an ovarian cyst of large size being almost pathognomonic of the condition. Of course, pregnancy may coexist with the ovarian cyst, and then the diagnosis may be most difficult. As a rule, the question to decide will not be as to the existence of pregnancy, but rather the coexistence of a complicating factor, since the major signs of pregnancy—the fœtal heart-sounds and the cervical signs—are apt to predominate. A condition which is likely, on the other hand, to simulate ovarian cyst, is hydramnion, where the large amount of water present is apt to obscure the major signs of pregnancy, such as the fœtal heart-sounds. But then the cervical signs are present to influence our conclusion. Small ovarian cysts, impacted in the pelvis, are much more likely to obscure the diagnosis. Not uncommonly the rational signs of pregnancy will be present,—the nausea and vomiting, the amenorrhœa, the enlargement of the breasts, with possibly prominence of Montgomery's follicles,—and the close apposition of the cyst to the lower uterine segment will simulate the signs in this locality which are characteristic of gestation. In such instances, if the symptoms are of a nature urgent enough to require speedy diagnosis, it is advisable to anæsthetize the woman in order to make the careful bimanual examination which ought to clear the diagnosis. If a waiting policy is allowable, then, in the course of a few weeks, the diagnosis may be reached through the development of signs more characteristic of pregnancy. In any event, remembering that to-day the surgical rule is to remove an ovarian cyst before it has attained great size, it will not be wise to temporize overlong, but, in view of the safety of anæsthesia, to resort to this method of certifying the diagnosis.

Ascites should not lead to difficulty in differential diagnosis except where pregnancy coexists, and then many of the characteristic signs of gestation may be masked by the enlargement of the abdomen due to the presence of fluid. Particularly is this apt to be the case where the fluid is encysted, for then we shall not obtain the evidence of free fluid in the peritoneal cavity yielded by change in position of the woman, but we may have a tumor similar in outline to that of the gravid uterus. The rational history here, however, will not be that of pregnancy, and local examination will reveal the absence of the cervical and uterine changes of gestation. In a very obscure case, however, it may be necessary to resort to anæsthesia in order to reach a diagnosis.

The condition above all most difficult to differentiate, and yet calling for early and accurate diagnosis, is the distinction between uterine and extra-uterine gestation. On the differentiation the life of the woman may depend, and, fortunately, the information obtained in modern times usually enables us to avoid making the mistakes in diagnosis of the past. The symptoms of early ectopic gestation may be exactly similar to those of normal pregnancy. There is the same rational history of amenorrhœa, and of nausea and vomiting, coincident with the mammary and the local signs. Generally, however, on close questioning, certain points of value from the differential stand-point will be evoked. Thus, usually a history of precedent disease of the genital system may be obtained, associated with a period of relative or of absolute sterility. At the eighth week of gestation or thereabouts the woman has irregular hæmorrhages, at times associated with such sharp, colicky, abdominal pains as to cause fainting or actual collapse. The hæmorrhage is of special significance, since this is inconsistent with *normal* pregnancy. These symptoms should always call for a local examination, when, in addition to the enlargement of the uterus which accompanies ectopic gestation, a tumor will be found in the region of the broad ligament, which is, to a greater or a less degree, tense and giving evidence of congestion. Such symptomatology should always awaken the keen anxiety of the physician. It will not follow that uterine pregnancy is absent, but the chances are that ectopic pregnancy complicates. The woman should be watched and examined daily to determine if the tumor to the side or behind the uterus is enlarging. When the hæmorrhages recur the discharge should be examined for the presence of the decidual membrane which is shed in these cases, but which is rarely seen. If the symptoms recur, then the time has come for examination under anæsthesia to reach a more exact diagnosis, when, if the inference is strong that ectopic and not uterine pregnancy exists, the course of treatment outlined in the section dealing with obstetric surgery should be followed. If the case be not seen until after rupture into the layers of the broad ligament with development of the fœtus, instead of its death, then the diagnosis is often impossible, notwithstanding all our methods. Fortunately, the woman does not run the same immediate risk that she does prior to the twelfth week, and expectant treatment may be allowable until term. Usually, in these instances of broad-ligament gestation advanced beyond the fourth month, examination under anæsthesia will enable the physician to differentiate the uterus from the ectopic-gestation sac with sufficient degree of certitude to warrant him in examining the interior of the uterus for the purpose of proving it empty. Whilst the fœtal heart-sounds will be heard, it is questionable if the intermittent uterine contractions are ever present in the ectopic sac, and then the fœtus can be palpated much more readily through the abdominal walls than is possible in normal pregnancy, except in very exceptional instances when the uterine walls are excessively thin.

Management of Gestation.

Whilst gestation is a physiological process and, in a normal woman under normal conditions, ought to progress without entailing greater strain than the system is prepared to stand, the great alterations in the sexual organs and the concomitant strain to which every other organ in the body is subjected call for watchfulness on the part of the physician and radical change in many respects in the habits of the woman.

Since the system is subject to extra strain, it follows, at the outset, that extra food is requisite in order that the system may bear this strain after a physiological manner. As a rule, the woman should be allowed to eat whatever she finds agrees with her, eating as freely as is possible of fresh meats, vegetables, milk, fruits, and water. Highly-spiced articles of diet are objectionable, not on the ground that they are apt to affect the fœtus unfavorably, which is the popular idea, but because such articles do not, as a rule, contain the elements best qualified to nourish the system. Where the nausea and the vomiting of early pregnancy are pronounced, it will often be a very difficult matter to persuade the woman to ingest sufficient food to nourish her, and yet this is a period of gestation when it is, above all, essential that the system should be well nourished in order to prepare it for the great strain it will be subject to as gestation progresses. Fortunately, we are able now to utilize a large number of predigested articles of diet which contain the essentials for proper systemic nourishment. In aggravated cases of nausea we can nourish efficiently for the time by utilizing the rectum. Ordinarily the appetite of the woman will depend largely on the state of the intestinal canal. The nausea and vomiting of early pregnancy should not be considered a pure neurosis, but the fact should be recognized that torpor of the liver and the consecutive constipation are responsible for a large share of the disturbance. Women are by nature and by force of habit of a constipated type, and, when the interference by the growing uterus with the lower bowel is superadded, this habit simply becomes intensified. Further, it is surprising what a mass of fæcal matter the average woman unconsciously carries in her colon, and this, too, although she will state that her intestinal tract is emptied each morning. So it is, but rarely thoroughly. As a rule, it will be found advisable to instruct the woman to take a laxative each night or every other night on retiring. Enemata, as a routine measure, should be avoided, since their constant use can but result in aggravating the hæmorrhoids which are an associate in many instances of late gestation, and because, furthermore, injections into the rectum are very apt to irritate the uterus and may induce premature labor.

The hygiene of the skin should receive careful attention. Daily baths are not only allowable, but are indicated as one of the means for relieving the great strain to which the kidneys are subject during gestation. These baths may be taken, contrary to lay opinion, up to term. Vaginal injections, if the water be lukewarm and not in excessive amount, are not likely to do any damage; indeed, are valuable as a means of keeping this canal reasonably clean. Where the normal secretions of the vagina are intensified during pregnancy, or where there is present a profuse secretion from the cervical canal leading to irritation of the external genitals, these injections should be ordered, associated with some astringent, such as powered alum 1 teaspoonful to the quart of water, and, in aggravated cases, the physician should apply astringents to the vagina, such as nitrate of silver, in the strength of 1 drachm to the ounce of water. Such a measure will be forced on the physician in the presence of a leucorrhœa of a very acrid nature, otherwise the nervous system of the woman will suffer from the constant pruritus. Sexual intercourse during gestation must be left to the desire of the woman. The only advice the physician can give is in regard to moderation. Of course, in instances where abortion or premature labor is feared it should be absolutely interdicted.

The urine of the gravid woman should be examined carefully throughout gestation, at intervals of every two weeks at least during the later months, and oftener in the event of albumin being detected. Not alone, however, should albumin be tested for, but also urea, and during the later months of pregnancy the amount of urine passed in the twenty-four hours should be measured at intervals. Too great stress is ordinarily laid on albumin, to the neglect of the amount of urea. This is one of the means of forestalling eclampsia, or of determining when to interfere in order to save the integrity of the kidneys.

The clothing of the woman should be warm, and yet not so heavy as to tire her. The abdomen and the breast should not be subject to compression. The average corset should be discarded and one or another of the modern waists, devised to support these regions and yet not to compress, should be worn instead. It is essential that the abdominal walls should have ample space in which to expand, that the respiratory functions should not be impeded through interference with the action of the diaphragm, and that the nipples should not be compressed by inelastic pressure. During the later months of gestation, particularly if there be a tendency to pendulous abdomen, the woman will find comfort in the application of an abdominal binder pinned from below upward so as to support the weight of the uterus. This binder, also, will relieve the dysuria from which many women suffer. Daily exercise, of the gentler type, should be taken, the guide as to the amount being dependent on the sensation of fatigue which the woman suffers. It stands to reason that overfatigue should be avoided, and yet it will be found very difficult to persuade many women to take exercise at all. This should be insisted upon, and at a time of the day when the sun is shining, and not after dark, as many women, if not expostulated with, will prefer. In the absence of a special symptom contra-indicating, railroad travel may be safely undertaken from the third to the seventh and one-half or even eighth month, and sea-voyaging is not to be forbidden except in the case of women who suffer from nausea. Indeed, many women are improved in health during gestation by such means of travel.

It may be laid down as a rule to be rigidly insisted upon, that the pelvic capacity of every woman should be gauged at as early a date as is possible, not alone to determine whether the woman is so built as to be able to bear a child in safety at term, but also to find out if there are present in the pelvic canal tumors not appreciable externally and yet of a nature to render delivery at term impossible. This subject of pelvimetry is amply exemplified in the portion of this work which deals with obstetric surgery, and we insist upon it here because it is, above all, necessary to impress upon the student that, without the data obtainable through pelvimetry and examination of the abdomen, he knows nothing about his patient except that she may be gravid. It is as safe to make a diagnosis of cardiac disease without listening over the area of the heart as it is to pretend to care properly for a woman during gestation and at term without having made a thorough examination at as early a date of pregnancy as is possible.

The mental condition of the pregnant woman will frequently require anxious oversight. Women of an emotional temperament are apt to become moody and despondent, brooding over their condition and fearing all sorts of untoward consequences. Fresh air and exercise and the effect of moral suasion suggest themselves as the best remedy for this condition. The physician may do much to dispel the woman's anxiety, and it will often be his duty to relieve the mind of the woman in regard to the possible effect of the so-called maternal impressions on the fœtus. However strong the apparent evidence may be in favor of the view that such impressions may affect the fœtus unfavorably, there is just ground and stronger ground for the belief that such impressions do not affect the fœtus.

The care of the mammary glands during gestation is of the first importance. The nipples should be kept free from pressure, and the breasts, if pendulous, should have due support. The wearing of a tight compressive corset should be discountenanced. The circulation throughout the breasts should be free, and the proper kind of support is that which aims at the prevention of local congestion without the exercise of pressure. Nowadays the so-called shirt-waists are the proper articles to wear for the giving of support. The nipples should be bathed frequently for purposes of cleanliness, but alum, tannin, and the like should not be used, since their only effect is to injure the delicate protecting epithelial layer. Traction on the nipples should not be allowed, since this is apt to set up uterine contractions, and it is very questionable if such traction will cause nipples to project which are lacking in erectile tissue. If the nipples are in a normal condition, after the birth of the child they will soon adapt themselves to the demands of lactation. It is, above all, necessary to avoid irritating the nipples by local applications and by traction, since it is recognized to-day that the most common cause of puerperal mastitis is the presence of cracks in the nipples through which elements of infection gain access to the glands. In case the nipples are depressed and altogether lacking in erectile tissue an attempt may be made at frequent intervals to cause them to project, but these attempts should be of a gentle nature and are only allowable because, if they should fail, the woman will not be able to nurse her child.

CHAPTER III.

PATHOLOGY OF PREGNANCY.

THE pathology of pregnancy includes all morbid conditions of the woman or the child which lead to deviations from the normal. Certain of these conditions must be looked upon as physiological, since, to a greater or a less degree, they are constant accompaniments of pregnancy. Therefore, the morbid conditions from the side of the woman must include: The pathological exacerbations of physiological processes and the accidental complications of pregnancy.

It is difficult and occasionally impossible to determine where physiological action ends and morbid condition begins. This is rendered doubly so from the fact, as is dwelt upon elsewhere, that we are not dealing with an individual in a condition of nature, so to speak, but with one whose physical being has been altered by the demands, rational and irrational, of civilization. Much which, in a state of nature, was physiological has been altered by civilization into a process which, in many respects, verges on the pathological.

We will consider at the outset the exaggerations of physiological processes which accompany gestation, and next dwell upon the accidental complications in pregnancy.

THE PERNICIOUS VOMITING OF PREGNANCY.

Whilst the nausea and the vomiting of pregnancy are physiological accompaniments, when the condition is exaggerated it is termed "pernicious" and is an exceedingly grave complication. Fortunately it is rarely met with in the aggravated type, and certain

German observers have gone so far as to deny its occurrence. A sufficient number of authenticated instances, however, have been reported, both here and abroad, to prove the grave nature of the complication.

Pernicious vomiting has been observed more frequently amongst primiparæ than multiparæ. The etiological factor cannot always be determined. Frequently reflex nervous action is at the bottom of the condition. Again, the cause may depend on morbid condition of the cervix, such as cervical metritis, erosions, and hypertrophic elongation of the cervix. On the other hand, instances are on record where none of these factors were at work.

In general, it may be stated that the pernicious vomiting is but an exaggeration of the morning nausea and vomiting, which are the rule rather than the exception in pregnancy. At the outset, at least a portion of the ingested food is retained at the midday and evening meals. The nausea is often associated with violent straining; so that the woman eventually complains of considerable abdominal tenderness. If the condition become aggravated, then the nausea persists, even though there is nothing in the stomach. Occasionally the condition is complicated by profuse salivation. Constipation is usually of an obstinate type.

As the affection progresses the woman becomes wasted, feeble, and feverish. The pulse becomes accelerated,—an index of weakness. The vomited matter consists of watery material tinged with bile. When the retching is severe the material may be tinged with blood. The tongue becomes brown and dry and fissured. Emaciation becomes extreme, and the woman passes into a typhoid condition. At times there occurs a reverse peristaltic action of the intestinal tract, and fæcal vomiting ensues. Even when the woman has reached this extreme condition it is not often that the fœtus is expelled prematurely, and, strange to relate, in certain cases where the woman has been tided over to term the child has presented very little evidence of lack of nutrition. It has seemed to thrive even at the expense of the exhausted mother.

Prognosis.—Hyperemesis of gestation should always occasion anxiety, and the prognosis should always be guarded. Especially is this the case where the woman reaches an extreme degree of emaciation and has had hectic fever.

Treatment.—The woman should be placed in bed and kept prone, since this position alone frequently ameliorates the nausea and the vomiting. Careful alimentation is to be insisted upon. A cup of black coffee taken the first thing in the morning allays in a measure, at times, the condition. Solid food must be interdicted, although the woman will not ask for it and could not retain it if administered. Milk and lime-water, one-third of the latter to one of the former, should be tested in small quantities at intervals of two hours. It should be borne in mind that at times the most readily digested foods are not retained and the craving of the woman should have respectful attention.

If all food be rejected it will be necessary to resort to rectal alimentation. Inasmuch as it may become necessary to feed by the rectum for a protracted interval, great care is necessary from the start that the rectum does not become irritated. This may in a measure be prevented by washing out the lower bowel frequently with cold water.

Peptonized milk, defibrinated blood, or egg-albumen, 4 ounces every three or four hours, may be utilized. The rectum is apt to retain its tolerance longer if a few drops of the tincture of opium be added to alternate enemata, and absorption of the food is more rapid if it be acidulated with dilute hydrochloric acid. It is to be borne in mind that all mucous surfaces absorb saline solutions very freely. Hot black coffee makes an excellent stimulant enema, and this may be added to advantage to the peptonized milk.

The rectum and the stomach should not be both utilized at the same time. Either one or the other should be given absolute rest. Lavage of the stomach should always be tested. The stomach-tube is inserted and about every six hours the organ is thoroughly flushed with a 2-per-cent. boric-acid solution.

It is needless to dwell upon the many drugs which have been recommended. Scores have had their advocates. There exists absolutely no specific. The drug which apparently assists one woman proves a lamentable failure in another. Oxalate of cerium has a very wide reputation. It may be tested in 5-grain doses frequently repeated, on the ground that if it does no good it will not do harm. Cocaine, in 4-per-cent. solution, administered 10 drops every three hours, may be tested for a few doses; but its effect will be found to be but transitory and it may possibly intensify the nervous condition in which, of necessity, the woman is. Ingluvin, administered in 20-grain doses every six hours, at times affords relief. Small doses of creasote, a few drops of tincture of iodine well diluted, Fowler's solution in $^1/_2$-drop doses every hour for six doses, drop doses of ipecac frequently repeated,—such are certain of the remedial agents which have been tested and which result in failure only too frequently. To quiet the restlessness of the woman in extreme cases it may be requisite to administer hypodermic injections of morphia; but this should be avoided as long as possible, since we must aim at keeping the intestinal tract in order.

The best results are probably yielded by washing out the stomach and by rectal feeding. It must be remembered that local conditions may be at the bottom of the hyperemesis. Any abnormality of the pelvic organs should be looked for and rectified if possible.

Remembering that normally the uterus is anteflexed and slightly anteverted, and that a degree of retroversion is not incompatible with the normal progress of gestation, the physician should simply look for exaggeration of these positions. In case retroflexion exists an attempt should be made to lift the uterus forward. In mild cases the woman should be placed in the left semiprone position, the fingers are inserted behind the organ, and pressure, directed forward and upward, may succeed in rectifying the displacement. If the organ is impacted behind the hollow of the sacrum, then a Sims speculum is inserted, a tenaculum is hooked into the anterior cervical lip, the uterus is drawn downward and then may possibly be pushed forward as the cervix is carried backward. Fortunately women with marked retroflexion rarely conceive. The manipulations should be gentle, of course, else the woman may be caused to miscarry. After reposition, a pessary of the Albert-Smith type, with large posterior bar, should be inserted to maintain the uterus in position.

In case of marked anterior displacement posture is sufficient. In case the cervix is eroded it should be painted with a solution of nitrate of silver, 30 grains to the ounce, and next dusted with boric acid.

Dilatation of the cervical canal has frequently proved of benefit. Anæsthesia is not requisite; indeed, the administration of either ether or chloroform will simply intensify the vomiting. Painting the cervix with a 10-per-cent. solution of cocaine may, in a measure, allay the pain, which at best is slight. The steel-branched dilators, figured in "Obstetric Surgery," should be selected for dilatation. The vaginal canal should first be irrigated with bichloride solution 1 to 5000, and the hands and the instruments should be sterile. The dilator is inserted to the level of the internal os, the organ being steadied by a tenaculum inserted into the anterior lip. The process of dilatation is slow and gradual. In aggravated cases the internal os must be dilated as well. This procedure may induce abortion, but we are only anticipating what may be forced upon us. Very exceptionally, however, if the dilatation be carefully performed, will the uterus throw out the ovum.

It is never justifiable to allow the woman to reach an extreme degree of emaciation. As a rule, active interference has been deferred too long. After the measures we have stated have been tested and yet the woman's condition becomes progressively worse, the time for active interference has arrived. It has been proven that, even in the face of the most desperate exhaustion, emptying of the uterus may avert a fatal termination.

Counsel should always be obtained before resorting to the induction of abortion. The operative measures are described in "Obstetric Surgery."

Aside from this pernicious vomiting of pregnancy there are certain disturbances of function associated with pregnancy which call for consideration. Salivation to an extreme degree is a rarity; still, instances have been recorded where the woman has, in consequence, been reduced to an extreme condition and where it has been necessary to interrupt gestation. This salivation is simply a reflex sympathetic phenomenon of pregnancy, and within limits need give rise to no anxiety. The best remedy for the milder instances is belladonna or its alkaloid, atropia, pushed to the physiological extent.

The serous diarrhœa from which certain women suffer may be the result of pressure of the growing uterus on the intestines, and it will often be cured by the thorough evacuation of the intestinal canal by a laxative and high enema. The latter should be administered with care, lest the uterus be irritated and throw off the ovum.

Many women suffer from neuralgias, especially facial and sciatic. Often full doses of arsenic will grant relief, or the anti-periodics,—quinine and Warburg's tincture. Toothache will usually be dependent on caries of one or more teeth, when the physician need not fear to counsel extraction. The risk of abortion being induced is to be dreaded less than the nervous strain the woman will be otherwise subject to.

In the latter months of pregnancy the woman will frequently suffer from cramps in the thighs and the legs. Massage of the extremities, by equalizing the circulation, will relieve these temporarily.

CARDIAC DISEASE COMPLICATING PREGNANCY.

When a woman with organic disease of the heart becomes pregnant she should always give her physician great concern. When we remember that, normally, the heart bears additional strain during pregnancy, it is easy to understand why the organ, already crippled, may be unable to perform its functions. Fortunately, as a rule, hypertrophy of the organ compensates the lesion.

This certainly holds true in instances where the cardiac lesion is not of an aggravated type.

Acute endocarditis not infrequently proves fatal through its tendency to become ulcerative. Women suffering from chronic endocarditis are rarely able to withstand the strain of gestation, since, as a rule, compensatory hypertrophy has already taken place, the woman being fairly comfortable until the greater hypertrophy is demanded by the occurrence of pregnancy. The heart is unable to stand the increased arterial tension which is associated with pregnancy, and not infrequently, although the woman passes through gestation, a fatal issue occurs during or immediately after labor. There exists inability on the part of the heart to accommodate itself to the sudden variations in the vascular tension during labor.

The reason why acute endocarditis complicating pregnancy is so prone to assume the ulcerative type cannot be stated. The impaired nutrition which is so frequently associated with pregnancy, together with the extra work the heart is called upon to perform, may co-operate to produce this result.

In case of chronic endocarditis the symptoms will depend on the site of the lesion and upon the extent of the injury to the valves. In case of aortic stenosis and insufficiency the symptoms often become marked during the early months. The woman will suffer from dyspnœa, a hard, dry cough, and occasionally she will have hæmorrhages from the lungs, stomach, gums, and nose. Where the cardiac lesion is not of an aggravated type the woman may go to term, and during labor these symptoms will manifest themselves or become greatly exaggerated. Syncope and cardiac paralysis may ensue.

Where the mitral valve is injured, if the lesion is slight and compensatory hypertrophy is complete, the woman may not manifest any cardiac symptoms unless an acute exacerbation occurs. Pregnant women suffering from cardiac disease are peculiarly liable to fresh attacks of endocarditis, on exposure to cold, for instance, or on unusual exertion. Compensatory hypertrophy may be sufficient to enable the woman to bear the extra strain of pregnancy during the early months; but often, without special warning, the woman may develop pulmonary œdema of a type rapidly fatal.

The effect on the fœtus in these aggravated instances is that it often dies *in utero*, or, if delivered alive, it is weak and succumbs at an early day.

Whilst not a contra-indication to marriage, cardiac disease is certainly badly affected in each succeeding pregnancy. In an early stage of the disease the woman may pass through her pregnancy and her labor without any untoward symptom. Each recurring pregnancy, however, aggravates the lesion; so that as soon as hypertrophy seems to fail or secondary dilatation takes place it is dangerous for the woman to conceive again.

In any event the physician will do well to give a guarded prognosis. Of course, where there exists disease of the heart secondary to disease of the kidneys his prognosis must be all the more guarded. Aside from pulmonary œdema, the complication to be feared in advanced cases of cardiac disease is embolism, and this possibility obviously always renders the prognosis more grave.

Treatment.—Since, where the cardiac lesion is aggravated, the infant rarely survives even though the woman be carried to term, we are not justified in jeopardizing the maternal life in order to give the child a very problematical chance of living. The broad rule may therefore be laid down that, where compensation does not exist or where secondary hypertrophy has set in, nothing will be gained by endeavoring to tide the woman to term. Medicinal treatment of the cardiac lesion will not vary from that which holds irrespective of gestation, except that earlier resort to the cardiac strengtheners will be needed. When, notwithstanding, the symptoms become intensified,—in particular the dyspnœa,—then, no matter what the period of gestation, the safe rule, after due consultation, is to empty the uterus, and this after as rapid a fashion as is consistent with the integrity of the maternal soft parts, absolutely no account being taken of the child.

If the woman reach term and is taken in labor the same rule holds,—which is to empty the uterus just as soon as this is feasible without inflicting unnecessary lesion on the maternal soft parts. The woman must be counseled against making any unnecessary effort. As soon as the cervix is dilatable or dilated, if the conditions for version (see "Obstetric Surgery") are present, this operation should be elected; if not, then the forceps should be applied.

Anæsthesia is requisite, and the physician should not hesitate, on account of the presence of the cardiac lesion, to resort to it. There is a choice in the anæsthetic. Ether should be avoided where kidney disease complicates, and also since it tends to provoke pulmonary œdema. In general, chloroform should be selected and be administered most carefully, since danger of cardiac syncope is imminent.

After delivery the physician should remain by his patient for a number of hours, since, frequently, everything has passed smoothly and of a sudden the woman dies. The attendance of the physician may not avail much, but he will receive the credit for having been in watchful attendance.

Strychnia hypodermically, $^1/_{16}$ grain repeated every two hours, will assist the heart in withstanding strain. Inhalations of oxygen will relieve the dyspnœa. Hypodermic stimulants—camphor, musk, digitalis, and the like—should always be in readiness to be used *pro re nata*, but spurring a weakened organ by drugs must be avoided.

If the woman die before delivery has become effected, the physician's duty is to perform the Cæsarean section, although this will rarely avail to save the child. Since relief from the strain of labor often adds to the life-limit of the woman, in cases where she reaches term and the cervical canal is soft and dilatable we question if, at times, it be not justifiable to anæsthetize the woman, perform manual dilatation, and deliver by version. This procedure commends itself in particular because, under the given conditions, it spares the woman many hours of strain which her weakened heart cannot stand as well as it may the necessary anæsthesia. The actual condition being critical, it must be met by emergency measures. In the event of the cardiac being secondary to a kidney lesion it may be necessary to elect the rapid delivery in order to avoid impending eclampsia.

There is probably no complication of pregnancy where it is less possible to lay down fixed rules for guidance. Each case constitutes an entity which must be treated according to the emergency nature of the symptoms. It must never be forgotten, however, that frequently the storm does not break until after delivery, and that therefore it is wisdom not to allow the labor to be protracted, which simply means extra exhaustion. Since it is of the utmost importance to conserve the vital forces as far as is possible, the physician should be prepared to tampon the uterus with sterile gauze in case of inertia after the completion of the third stage of labor, in order to spare the woman the loss of blood, which she cannot stand.

DISEASES OF THE KIDNEY COMPLICATING PREGNANCY.

Although the literature relating to disease of the kidney complicating pregnancy is enormous, it must be admitted that a satisfactory explanation of the clinical facts has not been offered. It is not the purpose of the author to attempt a *résumé* of the many theories advanced. The aim is to offer the student the data which justify a line of treatment which is in accord with the preponderating modern belief, frankly admitting that researches in the future may lead to modification of the statements in many respects.

At least two etiological factors appear to offer the best explanation of the renal complications of pregnancy: (1) the alteration of the blood associated with gestation; (2) the mechanical interference with the venous circulation through the abdominal and the pelvic viscera.

The blood of the pregnant woman is usually more watery than under normal conditions. It contains a greater proportion of the white corpuscles and a proportionate diminution in the red. This being the case, it seems plausible to assume that, as in other conditions associated with impoverishment of the blood, renal lesion may occur, with the excretion of albumin. We thus find a possible explanation for the occurrence of the albuminuria of gestation.

The other factor noted—the mechanical interference with the venous circulation—has many warm advocates, and yet a number of valid objections offer. Ovarian tumors much larger than the full-term uterus or fibroid tumors may cause as much pressure and consequent interference with the venous circulation; and yet these tumors do not, as a rule, lead to the renal lesion. When, however, we remember the intimate relationship between the circulation of the pelvic organs and that of the kidney, and also that this blood from the pelvis is all returned into the general circulation through the renal veins, then it appears allowable to lay considerable stress on the pressure theory as a cause of the renal lesion. It is a well-known fact that no tumor, be it ovarian or fibroid, malignant or benign, causes such development of the pelvic vessels as is associated with pregnancy. Hence it cannot be the mere pressure of the gravid uterus; but we must look farther for a cause of the renal lesions, and we may find it in the mechanical obstruction offered to the return of the blood through the renal veins. Further, the position of the renal veins protects them from direct pressure exerted by the gravid uterus. The lower part of the uterus being within the pelvic cavity and the promontory of the sacrum preventing backward pressure, the renal veins cannot be compressed, lying, as they do, in front of the second lumbar vertebra. Further still, after the gravid uterus has risen above the brim it presses forward against the anterior abdominal wall.

The renal complications of pregnancy may originate with this condition or they may be dependent upon previous attacks of nephritis, which are exacerbated on the supervention of gestation. The acute nephritis of pregnancy frequently attacks women who have never suffered from renal lesion. It ordinarily manifests itself without any marked disturbance of the general health and without any febrile reaction. Often the first symptom noted is œdema, and this is not limited to the feet, which frequently is associated with normal pregnancy, but extends not alone to the lower extremities, but also to the eyes and the hands. On examination of the urine albumin may be detected, sometimes only a trace, and, on microscopical examination, casts may or may not be found.

Again, œdema may not be present, and, unless it is the routine practice of the physician to examine the urine of his patients at regular intervals for urea as well as albumin, the renal condition may not be recognized at all. The woman may then be delivered without complication, or during labor or afterward eclampsia may ensue.

Frequently it is a difficult matter to diagnosticate this nephritis complicating pregnancy from a chronic parenchymatous nephritis. In the latter the specific gravity of the urine is not apt to be so high nor is the amount of albumin apt to be so great. Again, the number of casts is apt to be greater in parenchymatous nephritis.

In chronic interstitial nephritis albumin may never be found in the urine unless very frequent examinations are made, and even then the amount may be very slight. Indeed, high tension of the pulse, lessened amount of urine, diminution in the amount of urea, œdema, headache, and visual disturbance are more important from a diagnostic stand-point than the presence of albumin.

A further class of cases is furnished by women who are the victims of nephritis and become pregnant. Here all the former symptoms become exacerbated. The albumin increases in amount and the casts in number. Such women rarely progress to full term, the fœtus often dying *in utero*, the result being dependent, according to many, on changes in the placental structure.

It has been noted that eclampsia is far less frequent among women affected with chronic Bright's disease than among those who develop acute nephritis during pregnancy. This may, in part, be due to the fact that the former class of women are very apt to abort at an early stage of gestation.

Clinical History.—We have noted that renal complications may exist during pregnancy without the supervention of any special symptoms. Such, however, is the exception. At any rate, that physician is less likely to be taken by surprise who systematically examines the urine of his patients at stated intervals during pregnancy and who is watchful for the symptoms which are self-suggestive of kidney-lesion.

The urine of women suffering from chronic nephritis is usually markedly lessened in amount through concentration, and is high-colored. This applies, in particular, to instances of chronic parenchymatous nephritis. Headache and visual disturbances are frequent. Œdema may be very extensive. On exertion the woman is apt to complain of shortness of breath. High tension of the pulse is a fairly constant symptom. In case these symptoms increase as pregnancy advances, then, before labor, or during or afterward, eclampsia may develop.

Eclampsia occurs once in from five to six hundred pregnancies, unless the woman develops an acute nephritis during pregnancy, when the proportion rises to about 25 per cent. In this latter class of cases the maternal mortality ranges about 30 per cent. and the fœtal about 50 per cent.

In the vast majority of cases there are certain premonitory symptoms of eclampsia. Exceptionally, however,—and this point is to be remembered,—eclampsia occurs without previous evidence of kidney-lesion or premonitory symptom. The marked premonitory symptoms are: Headache; œdema of the feet, extremities, face, and external genitals; imperfect vision (spots before the eyes; at times, transient inability to see at all); dyspnœa; high-tension pulse.

The characteristic symptoms of eclampsia can scarcely be mistaken for any other condition. During the first few attacks the woman may simply pronate and supinate the forearms, closing the fingers upon the thumbs. Soon, however, the wide-open eyes become fixed in a vacant stare, the pupils being contracted, and this is followed by the rapid opening and closing of the lids and the rolling of the eyeballs from side to side. The muscles of the face partake in the convulsive action, the mouth being drawn to one side, perhaps, the head being tossed from one side to the other with great rapidity. The lower extremities are also in motion, the legs being rapidly flexed and extended.

During the seizure the heart's action becomes irregular, the vessels of the neck are prominent, and the face has a cyanotic hue. Respiration is impeded and becomes stertorous. As the seizure passes off the face resumes its natural color, the heart's action becomes regular, and the breathing quiet. As a rule, the seizures do not last more than about thirty seconds, and in the intervals the woman may be aroused, except the attacks recur with great frequency.

When the convulsions are tonic in character the head and the mouth are drawn to one side, the eyes are fixed, and opisthotonos may occur. The heart's action is very irregular and respiration may be suspended. This tetanic spasm is also of short duration,—about thirty seconds; but such violent interference with the heart's action, if repeated, must eventually result in cessation and death. As regards the number of seizures, they are variable, as many as seventy-five to one hundred in twenty-four hours having been noted. After delivery, in favorable cases, the convulsive seizures become less frequent, or cease at once. Occasionally, however, the attack does not manifest itself until some time after the birth of the fœtus.

From this analysis of the symptomatology of eclampsia we feel justified in accepting the view that, whatever the prime etiological factor, a secondary factor is *uræmia*, or, rather, *urinæmia*. Either the excretion of urea is interfered with or else there is increased production over elimination. This fact would seem to be certified by the results secured through resort to treatment the aim of which is to favor the elimination of the urine in full amount. Whether the urea acts as a poison after decomposition in the blood or not is uncertain and, as yet, theoretical. Sufficient the recognition of the fact that, in a large proportion of cases, if not in all, we are dealing, in part, with the effects of a poison on the higher cerebral centres and on the spinal centres. In short, the preferable descriptive term to use for this condition is *toxæmia*. The poison—whatever it be—is unquestionably of a mixed character. Whilst urea and its derivatives play a part, these are not the sole factors.

Prognosis.—The prognosis of eclampsia is always grave, although of late years this has been very much modified through resort to measures of a less temporizing nature in the presence of the preliminary renal evidence which usually forebodes the occurrence of the seizure.

Treatment.—Seeing that renal lesions may and very frequently do affect pregnancy in an unfavorable manner, it is especially incumbent on the physician to examine the urine of his patients at intervals in order to detect the supervention or the presence of nephritis. When only traces of albumin are detected or when symptoms suggestive of impending toxæmia have not manifested themselves, much may be accomplished by dietetic measures. The woman should be restricted to a non-nitrogenous diet. Milk is by far the best food for the woman suffering from the acquired or existing lesion of the kidney, whether it be only functional or organic. The consensus of opinion is that meat should be absolutely forbidden as well as alcoholic beverages. Articles of diet containing much starch, such as bread and potatoes, should be partaken of in moderation. Since anæmia is an accompaniment of lesion of the kidney, and since, when absent, the tendency is toward it, iron in an easily assimilated form, such as the peptonate, should be given in full doses. This is a precaution which should never be neglected in instances where it is necessary to keep the woman for a prolonged period on an absolute milk diet.

The woman must be protected from the possibility of taking cold as far as may be. She should be told to wear flannel, and this will also tend to keep the skin moist, such diaphoresis assisting and relieving the kidneys. The sweat-glands eliminate the urea, or, rather, the carbonate of ammonia into which it is altered. An abundance of water should be drunk in order to flush the kidneys, so to speak. Frequent hot baths are valuable adjuvants as exciting the sudoriferous glands to action, and, in case symptoms of impending toxæmia manifest themselves, then the hot pack should be administered, associated with high rectal irrigation, the temperature of the water being about 118° F.

Another channel through which the urea and its product may be eliminated is the intestinal canal. Therefore the bowels should be kept free by the administration of laxatives.

In instances where there is high tension of the pulse glonoin should be ordered in full doses,—that is to say, $^1/_{50}$ grain should be administered every three hours until the tension abates, and then the drug should be given at greater intervals *pro re nata.* By attention to these measures it may frequently be possible to carry the woman to term and to deliver without the supervention of eclampsia. It must be remembered, however, that this untoward complication may set in even when the "sky is most serene," and therefore the greatest watchfulness is called for until the woman has been delivered.

In instances where, notwithstanding these dietetic and hygienic measures, the albumin increases in amount or the urea diminishes, and the other symptoms—headache and œdema—become intensified instead of lessening, the time for dallying has ceased and it becomes the duty of the physician, after due consultation, to take steps for the emptying of the uterus after the manner described in the section of "Obstetric Surgery." As stated in that portion of this work, we should not wait until the symptomatology has become extreme. If we do, even though we save the patient's life,—and this will rarely be possible,—it will be with greatly aggravated disease of the kidneys and possibly with impairment of vision or hemiplegia or paraplegia.

When eclampsia develops suddenly, with or without the premonitory history we have dwelt upon, then time is not to be lost. The uterus must be emptied by as rapid a measure as is consistent with the integrity of the woman's genital tract. We cannot hope by delay to save the child, and each recurring convulsion simply makes matters worse for the woman.

Whilst awaiting the action of the method selected for emptying the uterus much may be accomplished by resort to measures which tend to lessen arterial tension. Venesection, in particular, is indicated where the pulse is full and bounding. As much as ten to sixteen ounces should be allowed to flow, according to the effect on the pulse. The tension may further be relieved by the hypodermic injection of glonoin, using $^1/_{50}$ grain at a dose and repeating hourly if required. This drug may be used more freely than is generally recognized, and with positive good effect without danger. Inhalations of chloroform to the extent of surgical narcosis form the most reliable of all methods for controlling the eclamptic seizures. Where venesection and glonoin are contraindicated by the absence of the full pulse of tension, morphia hypodermically in full dose will tend to quiet the woman. Chloral-hydrate, in doses of 40 grains by the rectum, will have the same effect, and bromide of soda in the like dose may be added to the enema.

These measures are of value in keeping the woman quiet and in sparing her nerve-force whilst the measures are being taken for the emptying of the uterus. As is noted under the subject of "The Induction of Premature Labor" ("Obstetric Surgery"), the ordinary measures for the emptying of the uterus in the face of a complication which cannot be termed one of emergency are too slow in the presence of eclampsia. The elective accouchement, the so-called *accouchement forcé*, here finds its sphere. If need be, the "Dührssen" incision of the cervix may be resorted to.

DIABETES COMPLICATING PREGNANCY.

In studying this subject we must carefully differentiate glycosuria occurring as a functional derangement and that which is characterized by the constant and, it may be, increasing presence of sugar in the urine. During pregnancy, even as is true aside from the condition, sugar is frequently found in the urine, especially after eating, but is of a transitory nature and need occasion no anxiety, even as it gives rise to no symptom. It is diabetes proper with which we are concerned, and this may exist before the supervention of pregnancy or may develop during its course. As a rule, unless the condition has existed before the occurrence of pregnancy, the glycosuria will rarely be diagnosticated until the later months, for, if the characteristic symptoms are not prominent, the physician will not examine the urine for sugar.

The complication must be considered a rare one, unless we assume, as is plausible, that it is often overlooked, for very few cases have been recorded.

The occurrence of glycosuria after delivery and during lactation, however, is quite common, and this fact has led to the impression that there exists a causal relationship between the function of the mammary glands and the development of diabetes. Certainly, what is termed physiological, or functional, glycosuria is quite common during lactation.

Diabetes proper, when associated with pregnancy, is apt to be of a malignant type, so much so that certain observers claim that the diabetic woman should be counseled against marriage,—a view which we share. The symptomatology of diabetes does not differ from that aside from pregnancy except that the proper symptoms of the latter condition are intensified. The gastric symptoms are increased and the urinary excretion is of greater amount than is the case in diabetes unassociated with pregnancy. Salivation to an exaggerated degree is apt to be present.

Where a fatal issue has occurred in the few recorded cases, this has been due to coma. The question, therefore, arises: Are we justified in allowing a diabetic woman to go to term? The answer to this question must as yet remain an open one. Much will depend on the condition of the woman. If by means of the recognized dietetic measures the amount of sugar in the urine can be held in check, and if the woman do not offer other untoward symptoms of constitutional failing, such as increasing emaciation, cephalalgia, tendency to sleep, then under the most careful oversight she may be allowed to go to term. But if the reverse hold true, then nothing is to be gained by temporizing. The woman may at any time during the progress of gestation pass into coma; even if she reach term the disease has simply been aggravated, and it is questionable if her child will survive; during lactation, if this be attempted, the disease will simply become aggravated. It is wise conservatism, therefore, in any case where the progress of the affection is toward the worse, to induce abortion after due consultation.

Such statistical data as are at our disposal prove the wisdom of this advice. Of the twenty-four cases of which we can find record there were six maternal deaths from coma. These deaths occurred in all but one case before term.

If the emptying of the uterus be determined upon, then a rapid method should be selected, since the woman will not bear protracted strain.

DISPLACEMENTS OF THE PREGNANT UTERUS.

In the early months of pregnancy the customary anteversion and flexion of the uterus become somewhat exaggerated; but this never produces any symptom aside from the dysuria or the frequent micturation, which is dependent on the sinking of the heavy organ and on consequent traction on the neck of the bladder. In women of lax muscular development and in those on whom abdominal section has been performed the uterus may meet with insufficient support from the anterior abdominal wall and fall forward, constituting what is known as pendulous abdomen. This falling forward of the uterus is found in particular in multiparæ, especially those who have borne children in rapid succession. The symptoms associated with pendulous abdomen may become very marked and labor may be interfered with. The application of a suitable abdominal binder is indicated for the rectification of the malposition.

The condition is especially aggravated when there exists also a ventral hernia. In this complication, as a rule, the developing uterus pushes the intestines upward, and risk of incarceration hardly exists. Where, however, the hernia is adherent, then, at any time, symptoms of strangulation may offer. If we have reason to fear this occurrence, then, after due consultation, it will be wise to interrupt the course of gestation. Should the strangulation occur suddenly, then operation on the hernia is indicated, and this may or may not interfere with the progress of the pregnancy. Since, however, the development of the uterus will cause the site of the abdominal union, after operation, to yield and result in recurrence of the hernia, the welfare of the woman demands here, as well, evacuation of the uterus. (Plate III, A.)

Owing to the fact that endometritis is an associate of retroversion, pregnancy rarely occurs, or, if it does, gestation is interrupted spontaneously, since the diseased endometrium offers an unsuitable soil for the development of the ovum. If pregnancy should occur, however, and early abortion not ensue, then, if there be no posterior adhesions, either the uterus rises above the pelvic brim or else retroflexion occurs, and the fundus may become incarcerated below the promontory of the sacrum.

If the uterus does not spontaneously rise above the brim, then symptoms of incarceration ensue. The symptoms will at the outset be more marked from the side of the bladder, because the peritoneum of the anterior *cul-de-sac* is drawn more tense, and distension of the bladder after the normal fashion is interfered with, and also because the cervix is forced forward and may press so firmly against the vesical neck as to prevent the escape of the urine. These symptoms develop gradually. Painful defecation or obstipation may exist from the start, the result of the pressure of the fundus on the rectum. Frequently pelvic peritonitis ensues. Not infrequently spontaneous abortion occurs before the symptoms become aggravated to this degree. In very rare cases rupture of the bladder has resulted. Pressure-gangrene may follow the incarceration. The diagnosis, as a rule, may be made with ease. The vesical and rectal symptoms being out of proportion to those which may accompany early pregnancy, a vaginal examination is made and a soft body is found, occupying the posterior *cul-de-sac*, which may be readily traced laterally to the cervix, which lies tucked under the symphysis. Examination by the rectum will clear the diagnosis. Error is only likely in case the woman is very stout, when we may be unable to determine the absence of the body of the uterus in front, and the condition may simulate a soft fibroid or an exudate in the posterior *cul-de-sac*. In such obscure instances anæsthesia should be resorted to, since, if the correct diagnosis be not reached, symptoms of a grave nature will ensue.

A large cystic ovary and an extra-uterine gestation-sac are other conditions which it will be necessary to differentiate. In both of these instances, however, the fundus of the uterus can be made out anteriorly except the woman be very stout, in which event anæsthesia is called for.

The treatment of retropositions of the gravid uterus consists in reposition. This may prove an easy or be a very difficult affair. The bladder should be emptied. It will rarely be necessary to puncture the bladder, since ordinarily the soft catheter may be inserted. In case of difficulty, however, then, under strict asepsis, the puncture may be made in the anterior fornix, selecting the midline, or else suprapubic puncture is necessary. The rectum is next emptied by enema, and then the vagina is rendered sterile according to the methods outlined in "Obstetric Surgery." The woman is next placed in the Sims position, a tenaculum is inserted into the anterior cervical lip, and traction is made in the axis of the pelvic outlet. Two fingers of the left hand are next inserted into the vagina, after the speculum has been removed, and the attempt is made to push the fundus forward. Should this fail the like manipulation through the rectum may succeed, since the pressure can thus be directed higher against the fundus. As the pressure is exerted it must be to one or the other side of the midline, in order to dislodge the organ from beneath the promontory of the sacrum.

These manipulations, if carefully performed, will rarely cause abortion; but even if they do the result is simply that which would have occurred had we failed in rectifying the malposition, to say nothing of the major risks the woman would have run.

In the event of there existing posterior adhesions, then attempts at reposition will, of course, fail. In many cases these adhesions stretch and the uterus rectifies itself. But it is never wise to await this result, since incarceration is more likely to occur than spontaneous rectification. In any event, as soon as symptoms of incarceration set in, if it be impossible to correct the malposition, abortion should at once be induced, always, except in strict emergency, after the support of a consultant has been secured,* unless, in full view of the added risk, the woman elects the breaking up of the adhesions through an incision in the posterior vaginal fornix or per abdomen.

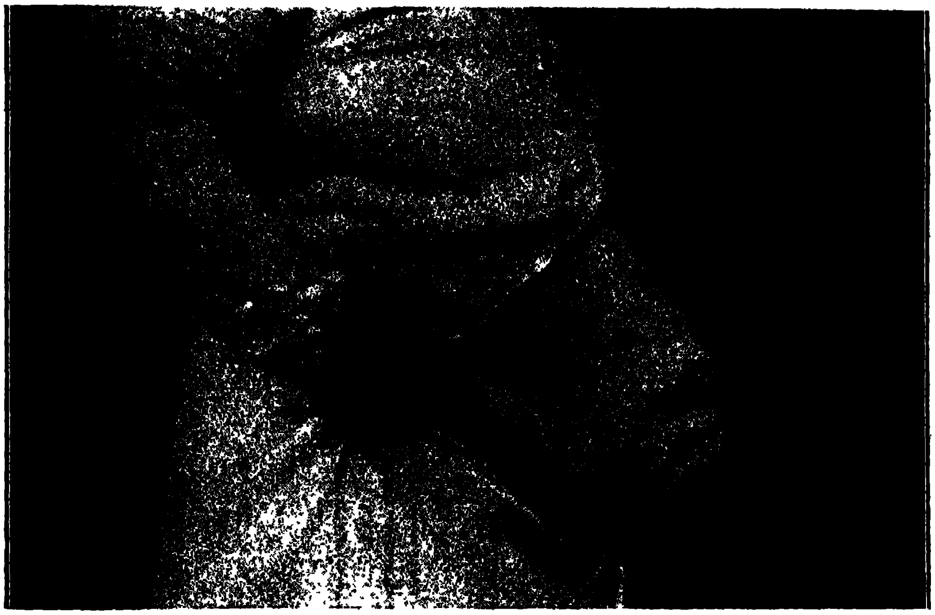
Prolapse of the uterus to the first and the second degrees frequently complicates pregnancy, but it usually rectifies itself as the uterus rises out of the pelvis. Prolapse to the third degree is rare, and if the organ cannot be replaced and maintained in position abortion will ensue. (Plate IV.) Hypertrophy of the cervix may simulate prolapse, but vaginal and rectal examination will differentiate, since the body of the uterus will be found in fairly normal position.

The recumbent posture and reposition will correct the symptoms associated with prolapse of the milder grade. After the uterus has risen above the brim the prolapse cannot recur to much degree, although the pressure symptoms will be aggravated. In the event of its being impossible to replace the uterus or to maintain it in position, then, after consultation, the organ should be emptied, thus anticipating that which will otherwise occur spontaneously.

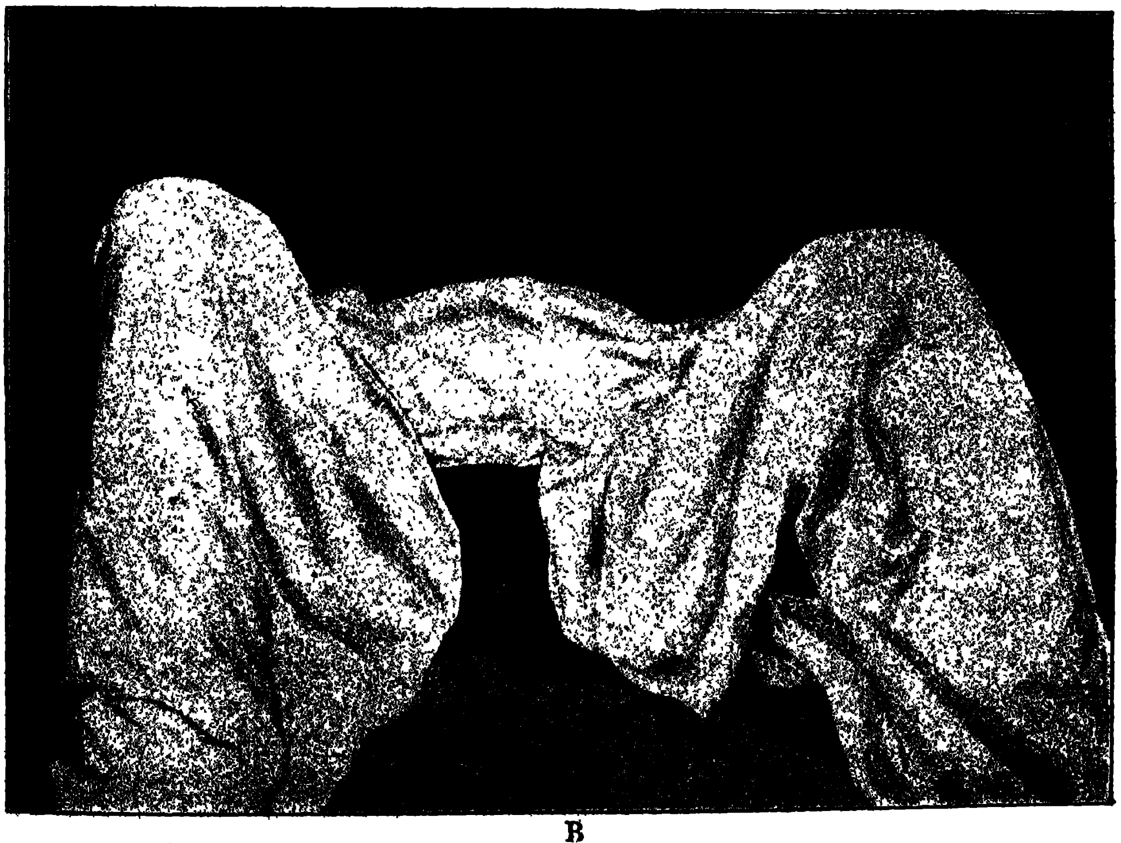
ABNORMALITIES OF THE VAGINA.

Certain diseases of the vagina are intensified by pregnancy. Catarrhal vaginitis will frequently be a source of great discomfort during pregnancy. The discharge becomes aggravated, and it may be very irritating, leading to pruritus. If there be a history of gonorrhœa the infection must be exterminated, not alone in the interests of the woman, but also of the child, since infection of this nature is the source of ophthalmia neonatorum. The vagina should be carefully painted, through a cylindrical speculum, in

PLATE III.



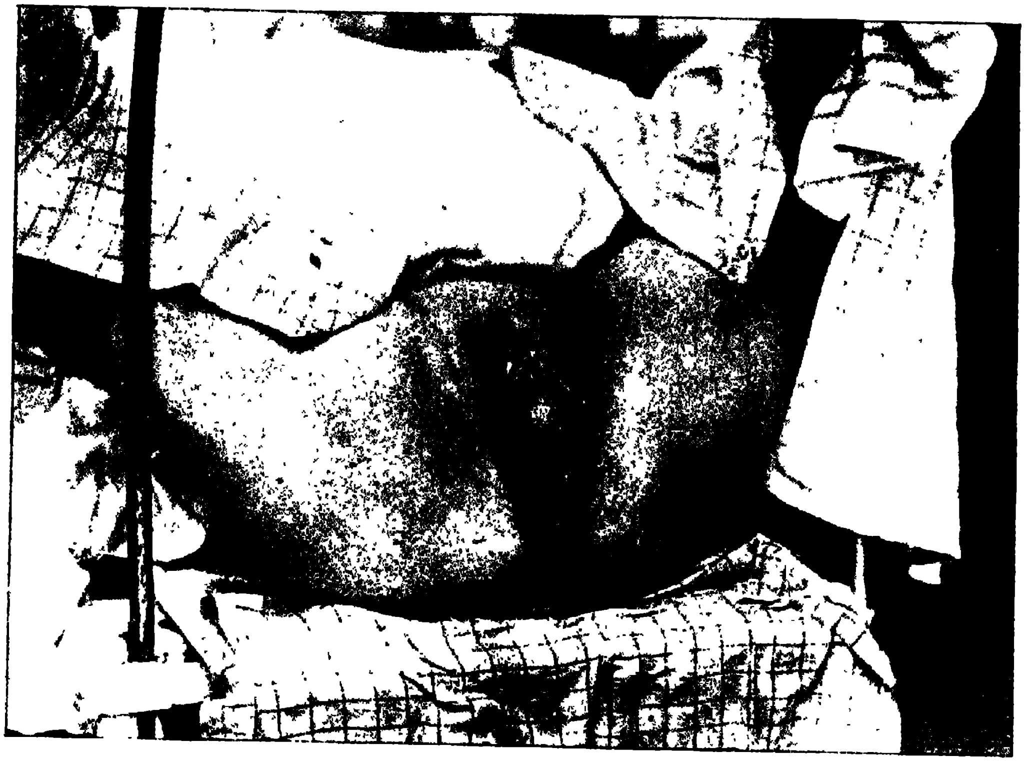
A



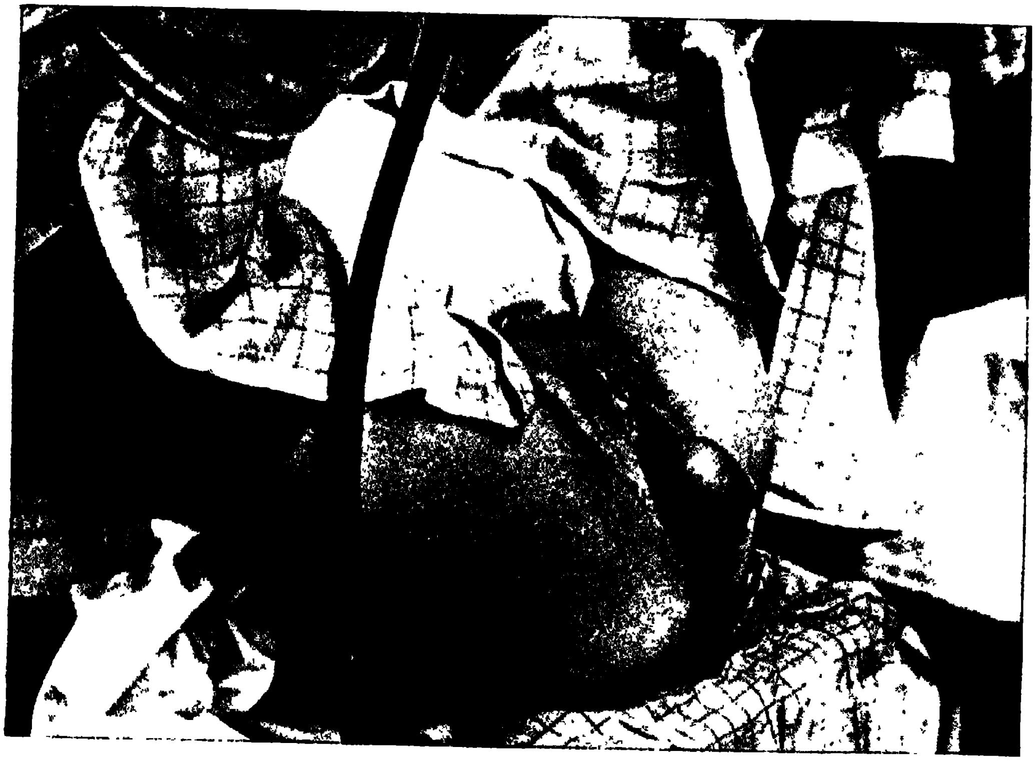
B

A. Ventral Hernia Complicating Pregnancy.
B. Cystocele Complicating Pregnancy.

PLATE IV.

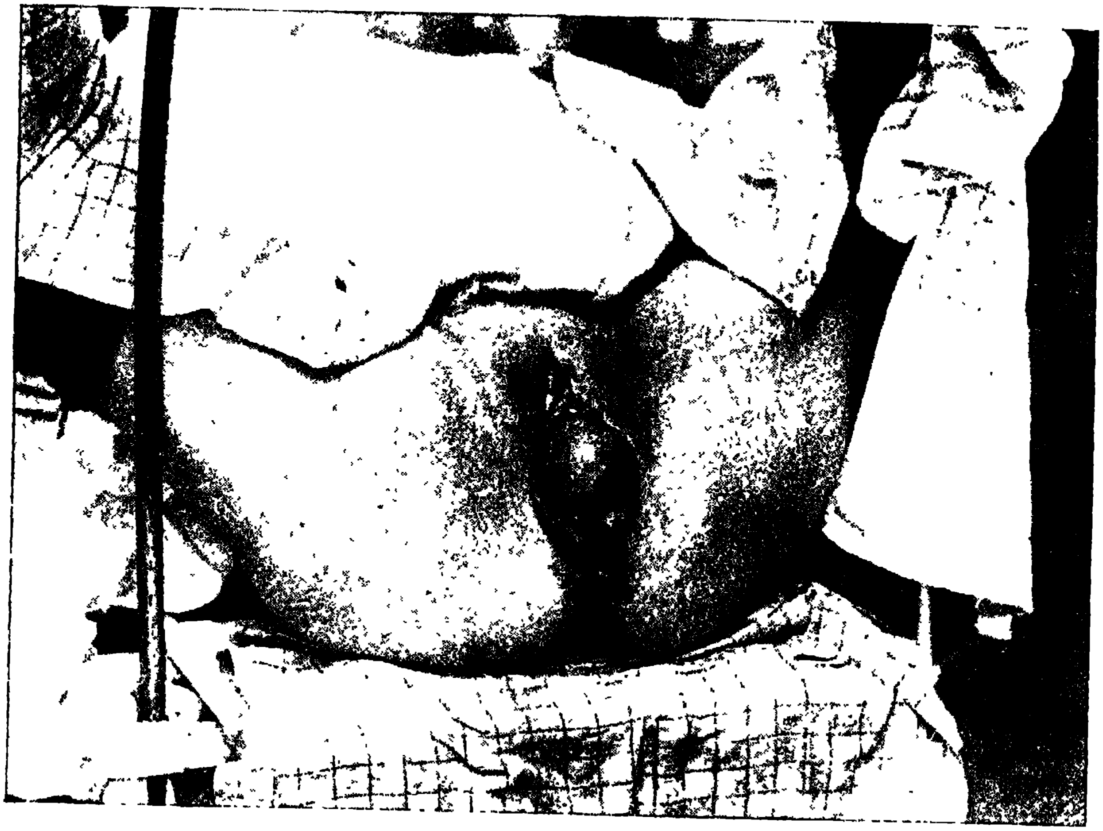


1 Prolapsus Uteri (Front View).

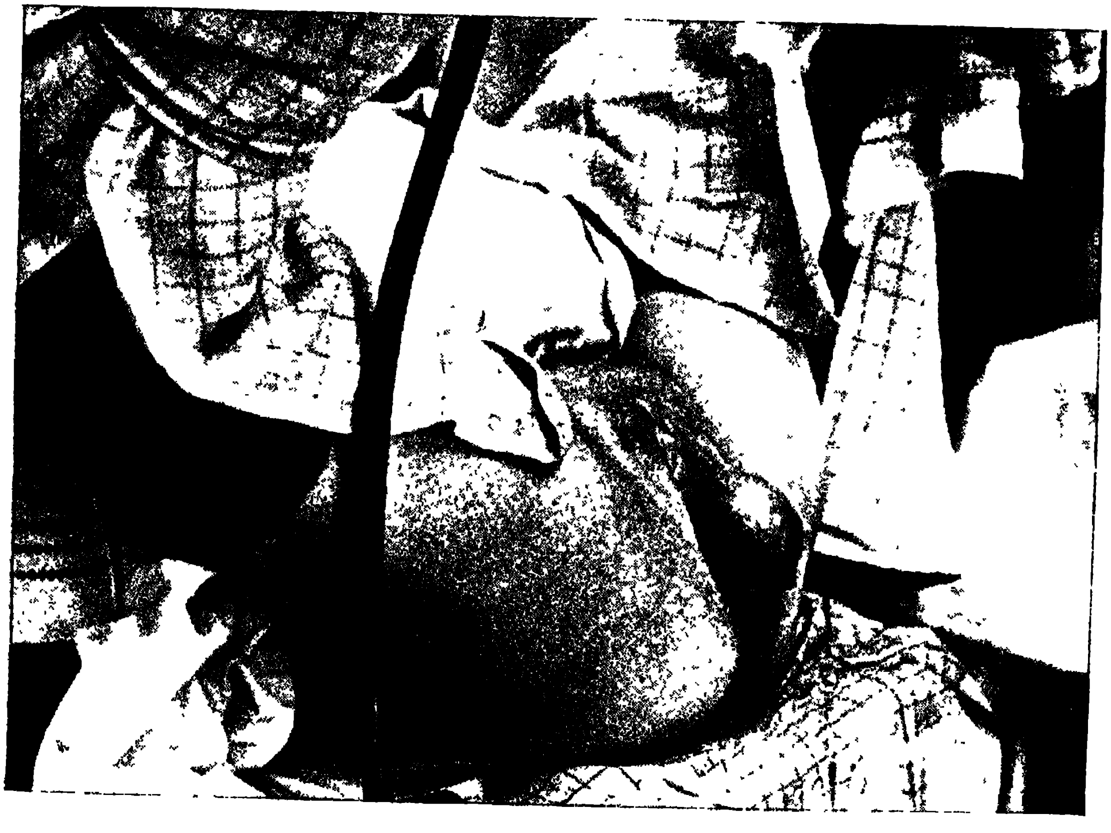


2 Prolapsus Uteri (Side View).

PLATE IV.



Prolapsus Uteri (Front View)



2 Prolapsus Uteri (Side View)

order to expose the rugæ, with a solution of nitrate of silver 30 grains to the ounce, and frequent douches of bichloride of mercury should be ordered, in the strength of 1 to 5000. In case of simple vaginitis douches containing 10 grains of powdered alum to the pint of water will suffice. Applications of a saturated solution of bicarbonate of soda will allay the pruritus, or else an ointment containing 10 grains of calomel to the ounce will assist.

Gonorrhœal condylomata will grow rapidly under the stimulus of the normal congestion of pregnancy. These condylomata as they grow have a great tendency to bleed, and this might lead to serious complications during labor. Equal parts of powdered alum and calomel, freely dusted on a number of times daily, will often cause them to shrivel. The knife should not be used, owing to their great vascularity, but, in case of need, the actual cautery is called for.

Prolapse of the anterior vaginal wall during pregnancy is usually due to loss of support from lesion of the pelvic floor. Irritability of the bladder is about the only concurrent symptom. The woman is unable to empty her bladder thoroughly and the alteration in the residual urine may result in a cystitis. (Plate III, B.) Catheterization and irrigation of the bladder with boric-acid solution will tend to make the woman comfortable. The patient may, to advantage, be instructed to void her urine in the knee-chest position.

PREGNANCY COMPLICATED BY CERTAIN ACUTE AND CHRONIC DISEASES.

The pregnant woman is not alone liable to accidental disease, but she is less able to resist the inroads of disease than when non-gravid. The acute infectious diseases are peculiarly dangerous, when they complicate pregnancy, by reason of their tendency to destroy the life of the fœtus. The life of the fœtus is imperiled by the high temperature, by the lack of nutrition,—owing to the effect of disease on the woman,—or it may become infected by the disease from which the woman is suffering.

Small-pox, measles, and scarlet fever are chiefly deserving of mention among the eruptive fevers. The gravid woman is peculiarly susceptible to small-pox, possibly because she has passed through the other eruptive fevers in childhood. The mortality-rate is very high, and statistics would show that it is especially apt to assume the hæmorrhagic type. Should the affection not terminate in the death of the woman the child is likely to die. The child, however, may be born with the characteristic markings showing that it suffered from the disease *in utero*, or it may develop the disease shortly after birth. In rare instances it has escaped unscathed.

Measles rarely complicates pregnancy, since the vast majority of women have it during childhood. In the event of its occurrence the hæmorrhagic type is likely to ensue, and pneumonia is a frequent sequel. Death of the fœtus not infrequently occurs during the progress of the disease, and abortion is a complication to be feared. The fœtus may contract the disease *in utero.*

Scarlet fever occurring during pregnancy is especially serious by reason of its tendency to cause lesion of the kidneys. Pregnancy causes hyperæmia of the kidneys, and to this is superadded the congestion which is the associate of scarlet fever.

The treatment of the eruptive fevers will not vary over-much from that called for aside from pregnancy. Means must be taken to control the temperature, otherwise the exaggerated rise will affect the fœtus.

Malarial fever is particularly apt to complicate seriously the puerperal state. During pregnancy there is no reason why quinine should not be administered. This drug has not been proven to induce abortion, although it is a decided accelerator of contractions when once they have set in. On the contrary, the administration of quinine in full doses, by modifying the disease, in so far spares the woman as well as the fœtus. Latent malarial infection will frequently not manifest itself until after delivery. It may then complicate the puerperal state, leading to a question, at the outset, of puerperal sepsis.

It was formerly the belief that pregnancy exercised a favorable modifying action on tuberculosis. Clinical experience does not bear out this view. Latent tuberculosis often does not manifest itself until the woman has become enfeebled by pregnancy. It seems valid to state that, on this ground, women with tubercular tendencies should be dissuaded from marriage, aside from the probability of the effect on the possible offspring.

Women who become infected with syphilis at the beginning of or during pregnancy manifest unusually severe initial symptoms and have proportionately mild secondary lesions. When the initial lesion is on the vulva it develops rapidly, owing to the normal exaggerated hyperæmia of the part. The ulcer rapidly spreads to the vagina and may even extend upward. Extension to the glands is slow, and the rash is apt to be light or does not appear at all. Syphilitic fever is rarely present.

The prognosis as regards the fœtus is unfavorable. This is especially so if the woman has become affected before impregnation. Again, the fœtal prognosis is less favorable if infection occur during the early months of pregnancy. The fœtus will be affected if either parent is syphilitic at the time of conception; that is to say, the semen, or its active elements, may be the carrier of the infection. Still, if the woman were not affected until after conception the fœtus may escape. In case the infection was active in either parent at the time of conception, then the fœtus will likely die *in utero*, owing to the changes undergone by the placenta.

Women who are known to be affected with syphilis at the time of conception should be subjected to rigorous antisyphilitic treatment. Local lesions should be carefully attended to, so that, in case the child escapes the infection whilst *in utero*, it may not receive it during delivery.

If the fœtus be born without evidence of the disease it should not be nursed by its mother, otherwise it may become infected. If the child be born with evidence of infection received from its father, the mother having escaped, it should not be nursed lest the woman become infected through the nipple.

Chorea is not a very frequent complication of pregnancy, and attacks by preference those who have an hereditary predisposition. It is far more common in primiparæ.

Etiologically, the lowered nutrition of the nervous system due to the hydræmia which is associated with pregnancy, together with the hereditary predisposition, must be considered as the cause.

The symptomatology does not differ markedly from that which is the associate of the disease occurring apart from pregnancy. The manifestations ordinarily set in during the early months and continue after delivery. Abortion and premature labor are frequent.

The prognosis is grave and must always be guarded. When death ensues it is the result of the constant muscular exertion which entails exhaustion.

The treatment does not materially differ from that which is proper in case of the disease aside from pregnancy. Ferruginous tonics of the easily assimilated type are indicated, and Fowler's solution should be administered in full doses. The constant administration of the potassium salts is contra-indicated on account of their tendency to interfere with the digestive process. The woman should be placed amid the best possible hygienic surroundings.

Should palliative measures prove of no avail and the woman show signs of exhaustion, then the artificial induction of abortion or of premature labor should be elected, after due consultation. Statistical data prove the folly of temporizing in extreme cases in the hope of securing a viable child. Of the 131 cases of which we find record there were 29 deaths. As a rule, in aggravated cases the child stands but little chance, since abortion or premature labor is very apt to set in spontaneously. Under the subject of "The Induction of Premature Labor," in the portion of this work devoted to obstetric surgery, we have given our reasons for recommending this procedure as one of election in all instances where the maternal condition is becoming altered for the worse.

Pregnancy is rarely complicated by icterus, but the disease assumes special importance from its tendency to become of a malignant type. The reasons for this are manifest. During pregnancy the venous congestion of the kidneys interferes with the proper elimination of the biliary salts, and there results lessened cardiac energy, owing to the accumulation of these waste-products in the blood, and therefore diminished excretion and poisoning.

The disease may manifest itself at any period of pregnancy. The prognosis for the child is gloomy, since the course of gestation is almost always interrupted. The cause of fœtal death is poisoning by the bile-salts circulating in its blood.

The causes of simple icterus occurring during pregnancy are the same as those which produce the disease apart from the gravid state. Acute duodenitis, with the consequent obstruction of the common duct, is the most frequent etiological factor. Often, however, the causal factor is not evident.

The diagnosis is readily established. The yellow discoloration of the skin and of the conjunctivæ, together with the urinary signs, will make the diagnosis.

Since simple jaundice is apt to assume the malignant type, the prognosis must always be guarded. Further, the great tendency of the affection to cause abortion adds to the danger which the woman runs.

The indications for treatment are the same as in case of the affection irrespective of pregnancy. In case of simple icterus the indication for the induction of abortion rarely will exist, since, as far as the woman is concerned, she is apt to recover if the affection does not assume the malignant type. As regards the child, if born during an attack of jaundice at all severe, it will rarely survive.

The transition of a simple icterus into the maligant form is gradual and usually manifests itself by rise of temperature, this being absent in case of simple icterus. Cerebral symptoms rapidly develop, such as headache, difficulty in speech, delirium. The course of the disease is rapid toward a fatal termination in a few days. The treatment can be simply symptomatic. It avails nothing to empty the uterus either in the interests of the woman or the child.

The intercurrence of pneumonia or typhoid fever during pregnancy affects the course simply in that the usual symptoms of these diseases are superadded to the normal symptoms of pregnancy. Pneumonia, of course, interferes decidedly with the life of the fœtus, owing to the high-temperature rise and the interference with the oxygenation of the blood,—the result of the lung affection. Nevertheless, the position of the physician as regards the pregnancy must be passive. It will avail nothing, either for the woman or the fœtus, to induce abortion or premature labor. The probability is that one or the other will ensue spontaneously, when, of course, the woman's chances of recovery are lessened, inasmuch as, in addition to the strain of the disease, she must withstand the strain of labor. The duty of the physician in such an event is to terminate the labor as rapidly as possible in order to spare the woman protracted strain.

Typhoid fever will rarely call for active interference with the progress of gestation. The chances are, if the attack be at all severe, that the woman will miscarry; if she do not, nothing is gained by attempts to save the woman the added strain of pregnancy by emptying the uterus.

Pernicious anæmia is an affection which, fortunately, is rarely associated with pregnancy. Such women rarely conceive, and, if they do, in the event of the symptomatology becoming aggravated, the physician is called upon to empty the uterus in order to spare the woman the additional strain which she cannot bear.

UTERINE TUMORS COMPLICATING PREGNANCY.

Fibroid tumors do not often complicate pregnancy, since, as a rule, they are associated with sterility. They may either be submucous, interstitial, or subperitoneal.

Submucous tumors rarely permit conception to occur. If it does, the uterine mucous membrane is kept in such a state of congestion that the ovum does not find a suitable soil for development. Early abortion is therefore the rule. Where the fibroid is attached to the lower uterine segment or to the cervical endometrium pregnancy may occur and may proceed to full term.

Mural or interstitial fibroids are less likely to interfere with conception or the progress of gestation. Their presence, however, may seriously complicate labor. This is especially so when they are situated in the lower uterine segment.

Subperitoneal fibroids are not likely to interfere with pregnancy except when they are situated where they can sink into the pelvis, when they cause pressure symptoms, and at the time of labor may interfere with delivery. Fibroid tumors participate in the hypertrophy incidental to pregnancy.

The diagnosis is oftentimes difficult, and when the tumor is small it may be impossible. Their presence may be entirely masked by the usual symptoms of pregnancy, and, again, the tumor may so obscure the major signs of pregnancy as to lead to error in diagnosis. In the majority of cases careful palpation will clear the diagnosis. If there be any doubt and the symptoms are at all urgent, anæsthesia should be resorted to. Vaginal and rectal examination will often enable the physician to differentiate the hard fibroid from the gravid uterus. The presence of the ordinary signs of pregnancy should render the physician very circumspect in inserting the sound into the uterus in order to reach a differential diagnosis. If the fibroid tumor be small it will not cause any symptoms during pregnancy, neither will it often complicate delivery. It becomes a matter, however, of concern if the pelvis is contracted by the presence of a fibroid which cannot be replaced above the brim. In this event the uterus must be emptied early if the cervical canal is accessible. If the uterine cavity is not accessible, then, pregnancy being well advanced, suprapubic hysterectomy is called for. The mere destruction of the fœtus without the removal of it will almost necessarily entail septicæmia, which jeopardizes the woman's life fully as much as an hysterectomy. In the event of the woman having reached term the simple Cæsarean section will not suffice, but the Porro must be superadded. Post-partum hæmorrhage and necrotic changes in the tumor are likely to ensue if the uterus be not removed. Even in the early months of pregnancy, where the tumor is of such a size and in such location as to interfere with delivery at term by the natural passages, hysterectomy should be advocated early instead of waiting until term in the hope of saving the fœtus. The extra development of the pelvic blood-vessels will subject the woman to too much risk at term in order to save a fœtus whose life is, at best, exceedingly problematical.

Submucous tumors which appear in the vagina should be removed at any stage of pregnancy, either by torsion or by cutting, after splitting the capsule where necessary.

Cancer of the uterus, if primary in the body, necessarily precludes the occurrence of conception. Carcinoma of the cervix does not interfere with conception. Even when the disease is well advanced and necrotic changes have taken place, certain women have conceived. The disease rapidly spreads on the supervention of pregnancy, as would be expected when we remember the increased hyperæmia which follows pregnancy. In case the disease is in its early stage gestation may not be interfered with. Where the disease has invaded the deeper structures of the cervix early abortion is the rule. Hæmorrhage is of frequent occurrence not only because of the necrotic process in the diseased area, but also as the result of the normal uterine growth and expansion. The hæmorrhage may be profuse enough to jeopardize the woman's life.

In the early months of pregnancy, if the disease is limited to the cervix, hysterectomy should be performed, since early operation offers a chance of prolonging the woman's life, and the slight chance of saving the fœtus by temporizing deprives the woman of this chance of cure through early operation. The disease rapidly progresses during pregnancy, and, even though the woman should go to term and be delivered of a live child, her chances from operative interference have simply been lessened through temporizing in the interest of the fœtus. In case the disease has extended beyond the cervix, then, the woman's life being doomed, only the interests of the fœtus should be considered and the attempt should be made to conduct the woman to term. In case the cervix and the vagina are so involved as to render dilatation impossible, or if it be probable that the dilatation will result in such hæmorrhage as to imperil the chances of the child, then the Cæsarean section should be elected.

Ovarian tumors are not uncommon complications of pregnancy. Abortion is not frequent unless the tumor, by reason of its location and the presence of adhesions, prevents the normal development of the uterus.

The ovarian cyst is usually excited to increased growth by the supervention of pregnancy. As the tumor increases in size a low-grade peritonitis may ensue, or else the pressure symptoms of pregnancy are greatly aggravated. Necrotic changes may occur in the cyst, from twisting of its pedicle or from direct pressure from the gravid uterus. The position of the tumor in the pelvis may preclude delivery unless operation be resorted to.

Unless the tumor be of a fair size its presence may be unrecognized. Where pregnancy has advanced to about the sixth month it may prove an exceedingly difficult matter to reach the differential diagnosis. If the cyst cannot be differentiated and yet the case is evidently complicated by something beyond pregnancy, or if the question of pregnancy has not been settled, then it is wise to resort to anæsthesia.

As soon as an ovarian cyst is diagnosticated it should be removed, irrespective of the presence of pregnancy. If the adhesions be slight it is perfectly feasible to perform ovariotomy without interrupting the course of gestation; but, aside from this, if the cyst be not removed, the woman is subject to the risk of twisting of the pedicle, with consequent necrosis and sepsis, as, also, to that of the occurrence of peritonitis. In case the woman is too debilitated, when the diagnosis is reached, to permit of removal, then, as a temporary expedient, it may be punctured, which will relieve certain of the pressure symptoms. Whenever possible, the vagina should be selected as the site for puncture, under, of course, absolute asepsis.

Small tumors presenting in the vagina and impacted should be punctured if not recognized until about term, since this procedure is preferable to spontaneous rupture during delivery.

It is very exceptional that in women of good health and antecedents there occur psychical disturbances during pregnancy. Melancholia to a greater or a less degree is not infrequent. Much may be done by firm conduct on the part of the physician to lessen the anxious fears of the woman, and yet, in a proportion of the cases, the melancholia deepens, and it will become a question of the induction of abortion or of premature labor, in order to prevent the development of insanity of, possibly, a permanent type. (Fig. 1, Plate V.) Young women illegitimately pregnant are peculiarly prone to deep melancholia, particularly in the better walks of life. In the event of the melancholia deepening, then, always after consultation, it may seem advisable to empty the uterus. It goes without saying that the greatest care is requisite not to be deceived by a simulated melancholia. The cunning of woman illegitimately pregnant should always be remembered. She will attempt to persuade her physician by every possible means into emptying the uterus.

The peculiar pigmentation of the skin, which is associated with pregnancy in many women, calls for reference. The term "chloasma of pregnancy" has been applied to it, and, in aggravated cases, it alters the woman greatly. (Fig. 2, Plate V.) The pigmentation may assume the appearance of a mask, whence the popular term. Chloasma is apt to complicate lactation rather than pregnancy, but when it is an associate of this latter condition it will probably simply be intensified by lactation. As a rule, the woman may be assured that it will disappear spontaneously when the sexual system has recovered from the demands of pregnancy.

DISEASES OF THE MEMBRANES AND PLACENTA.

We pass now to the consideration of affections of the membranes and the placenta, the occurrence of which alters pregnancy

PLATE V.

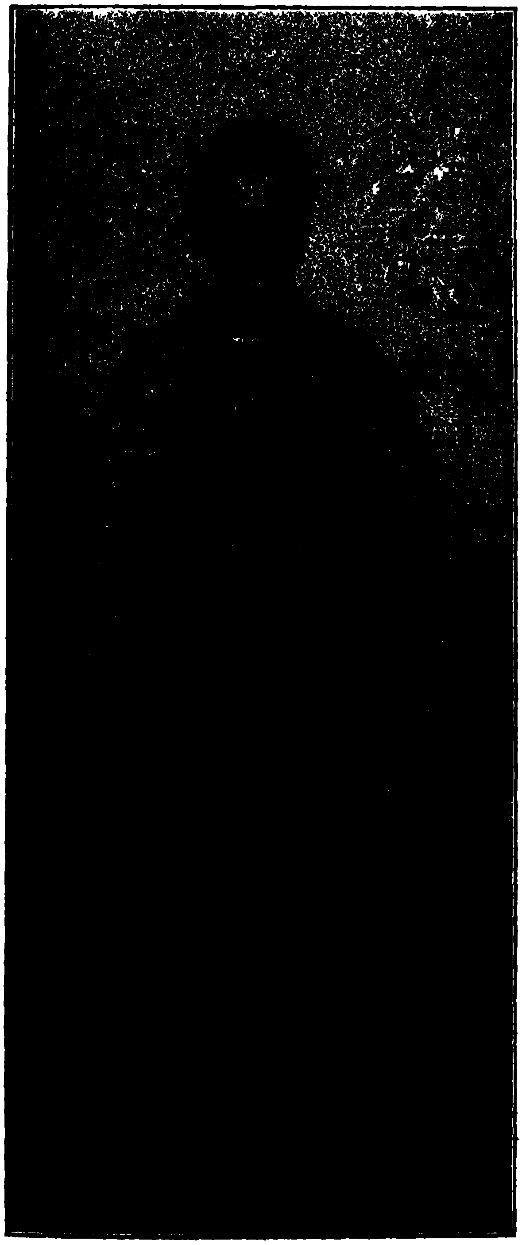


Fig. 1.—Melancholia Complicating Pregnancy.

Fig. 2.—Chloasma of Pregnancy.

from the normal to the pathological. At the outset it is to be remembered that, primarily, the majority of such affections are intimately linked with diseased states of the woman. Syphilis, for example, is an etiological factor of moment, as also disease of the interior of the uterus. Even an endometritis of light grade, antedating conception, renders the soil unfit for the proper development of the ovum, and, if the result be not abortion or premature labor, the effect is interference with certain of the phenomena of labor, as is amply dwelt upon later.

Disease of the decidua is apt to follow on an existing endometritis, or it may develop as the sequence of an acute intercurrent disease of the woman during the course of pregnancy. Thus, in the course of cholera, or scarlet fever, and the like, inflammatory changes may set in in the decidual lining of the uterus and thence spread to the placenta and the membranes. As regards the membranes, we thus may witness the development of a diffused inflammatory form of endometritis or else a degeneration resulting in what is termed "hydrorrhœa of pregnancy." As a rule, where inflammation of the decidua is not followed by miscarriage, no especial alteration in the phenomena of pregnancy is noticed, but difficulty occurs after the birth of the fœtus when the membranes are not shed under the natural efforts, owing to the morbid adhesions which have formed. In case of so-called hydrorrhœa of pregnancy the water may collect either between the decidua vera and reflexa, or between decidua and chorion, or between chorion and amnion. Whatever the case, the diagnosis is difficult, being made by the appearance at intervals of a discharge of water in greater or less amount from the uterus. In the few recorded cases the ejection of the water was associated with painful uterine contractions. The affection has but little import, seeing that it does not interfere with the progress of pregnancy or with the development of the fœtus. Of far greater import are the diseases of the placenta, since these lead to alterations in the progress of pregnancy and affect often the vitality of the fœtus.

Inflammation of the placenta is of chief import, owing to the changes which take place in the fœtal portion, leading to alterations in the chorion which affect pregnancy unfavorably. It will be remembered that the maternal surface of the placenta is formed from the decidua serotina and that the fœtal surface is formed by the villi of the chorion. The net result of changes in the maternal surface of the placenta may be hæmorrhage, the so-called apoplexy of the placenta, or calcareous degeneration at one part or in whole, or fatty degeneration. The phenomena are exaggerated according to the extent of the lesion. When extensive, the result is abortion or premature labor, or, if the pregnancy nevertheless progress to term, the shedding of the placenta and of the membranes is interfered with, owing to the morbid adhesions which have formed.

We may note, also, either atrophy or hypertrophy of the placenta, the effect of which on the course of gestation and on the life of the fœtus varies according as the processes are local or general. The prime etiological factor in most instances of affection of the placenta is syphilis, although alterations in the vascular system, the accompaniment of renal lesion, also are followed by the same result.

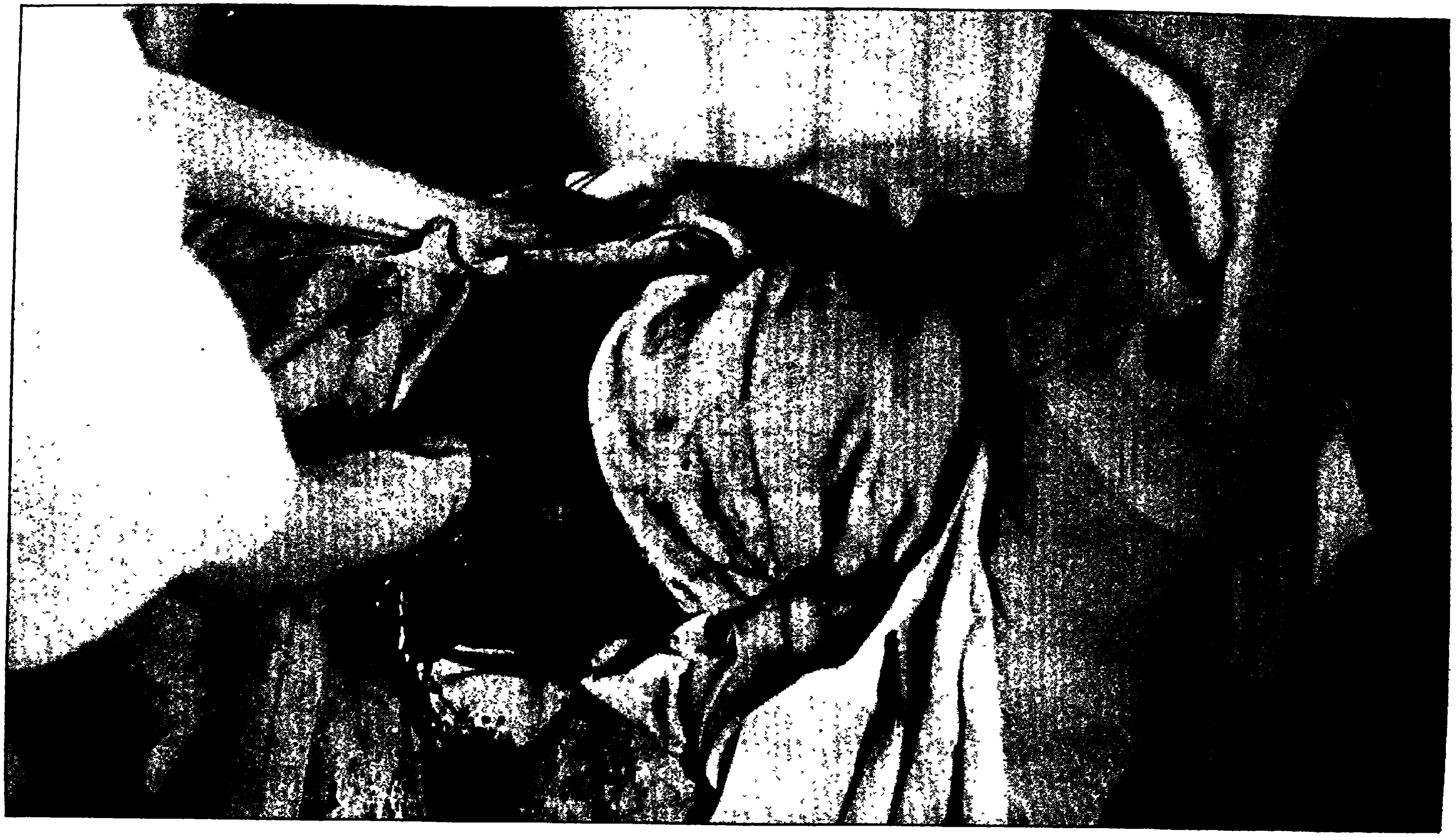
Diagnosis of these changes in the placenta is hardly possible until after delivery, when, frequently, careful microscopical examination will be requisite. The effect of the changes on the course of pregnancy is simply to interrupt it at one or another stage, where the changes are extensive.

A concomitant result is the formation of what are termed "moles." These moles are known as fleshy or else they result in the formation of hydatids, leading to what is known as hydatid degeneration of the chorion. The latter would seem to be dependent on a dropsy of the chorionic villi, although the matter is in dispute. The prime etiological factor is probably an endometritis antedating conception.

Cystic degeneration of the chorion is rather unusual in occurrence. Its presence is based on the following symptomatology:—

Rapid development of the abdomen not corresponding with the period of gestation which the woman thinks she has attained.

PLATE VI.



Manual Removal of the Placenta.

Recurring hæmorrhages. At times, if the blood lost be examined, it will be found to contain a number of hydatids. Frequently, the sole symptom up to the later months of pregnancy will be the exaggerated size of the abdomen. This will render the woman exceedingly uncomfortable, owing to the pressure symptoms, but the abdominal increase may lead only to the assumption that there exists multiple pregnancy. As a rule, however, it is the occurrence of repeated hæmorrhages which excites the concern of the woman and of her attendant, but this may mean, as will shortly be noted, vicious insertion of the placenta. Whether the occurrence of cystic degeneration of the chorion has led to early fœtal death or not, the usual signs of pregnancy are present except that, in the latter event, fœtal movements will not be appreciated; but this is not a diagnostic factor of value, seeing that not infrequently in normal pregnancy these motions are not appreciated.

The prognosis both for the woman and the child is grave. Not infrequently the woman succumbs to profuse hæmorrhage before the diagnosis is established with sufficient exactitude to enable the physician to feel justified in actively interfering. The cardinal rule for treatment, therefore, is not to temporize with hæmorrhage associated with pregnancy, for, even though this be dependent on vicious insertion of the placenta, and not on the development of a mole, the indication is the same,—to empty the uterus by as speedy a method as is consistent with the integrity of the maternal parts. Temporizing will avail the fœtus nothing, and the next hæmorrhage may be profuse enough to cast the woman into a condition of acute anæmia, if it does not kill her.

The method of procedure for emptying the uterus is described in "Obstetric Surgery." The uterus having been dilated, the entire hand should be inserted into the vagina and the fingers should clean out the interior of the organ. (Plate VI.) This manipulation is always preferable to the endeavor to curette the uterus. This instrument is liable to clean the organ only in part, and, then again, in advanced cases the uterine walls may be thin and perforation is likely to occur. The finger or fingers may, as a rule, explore the entire interior of the uterus, provided the organ be depressed by the external hand. Hæmorrhage during these manipulations is apt to be profuse, and therefore there is need of haste, and, when need be, the organ should be thoroughly tamponaded with gauze in order to check loss of blood which the woman, in probably a reduced state, cannot stand. It goes without saying that the most scrupulous asepsis should be associated with these manipulations.

The most important affection of the amnion is dropsy, or hydramnion.

Hydramnion consists in the accumulation of the liquor amnii in exaggerated amount in the amniotic sac. Within limits the amount of liquor amnii is very variable; so that it is difficult to differentiate the normal from the pathological. Enormous accumulations are exceedingly rare. As a rule the accumulation is gradual, and it is only in instances where the liquor reaccumulates rapidly that the symptomatology of pregnancy is markedly affected.

As the source of the liquor amnii is unsettled, even so is the etiological factor or factors at the bottom of hydramnion a matter of theory. Whether it be of fœtal origin or of maternal is in dispute, and probably the safe opinion to hold to-day is that both fœtus and woman are factors. The frequency with which hydramnion occurs in syphilitic women has been noted, and yet the affection not uncommonly develops in instances where there can be found no trace of syphilitic infection.

Dropsy of the amnion is a frequent complication of twin pregnancy, and in instances where the affection exists to an exaggerated degree the fœtuses are apt to be malformed. The occurrence of dropsy of the amnion, again, is not infrequent in repeated conceptions and is a common cause relatively of repeated abortion. As a rule, the affection does not show itself until about the sixth month of gestation. The nausea and the vomiting of early pregnancy is apt to persist and the woman is feeble and with a tendency to emaciation. Abdominal pain is a marked factor, the associate of the rapid stretching of the abdominal walls, in part, and also of uterine origin, the result of undue distension of the organ before its muscular structure has reached that stage of development which admits of such distension. Shortly, the abdomen rapidly develops in size, associated with a marked thinning of the uterine walls and great fluctuation. In consequence of this rapid development of the abdomen, pressure symptoms become exaggerated and œdema of the abdominal wall and of the extremities sets in. In extreme cases, fortunately rare, the woman becomes emaciated to an extreme degree; she cannot retain food, and hectic fever appears. The pains in the abdomen are almost constant, shooting down the thighs and interfering with rest. If nature do not interfere by the occurrence of spontaneous labor the physician must, in order to give the woman a chance for life. The uterus, however, in these extreme cases has lost contractile power, and it is exceptional that nature is able alone to empty it. This accomplished, uterine retractility is absent, and the physician must be prepared to tampon against profuse hæmorrhage.

The prognosis for the child is gloomy. It may be expelled from the uterus dead or else it lives for only a few days.

Such is the course of aggravated cases. Fortunately, as a rule, the condition does not take on an aggravated type, and passes unrecognized until labor sets in, when the enormous amount of water discharged makes the diagnosis. Even here the prognosis for the child is gloomy. The sudden discharge of the liquor amnii is apt to be associated with prolapse of the cord, and this should be borne in mind in order that the physician may resort to means for replacing the cord or for terminating delivery rapidly in the interest of the child whenever the condition of the maternal parts will permit.

In acute or in exaggerated cases it will not be a question of measures for saving the child, since ordinarily the child is dead if it be not shed prematurely; the question will be purely that of the woman's life. If the membranes do not rupture spontaneously it will be wise to rupture them artificially, high up in order to avoid the rapid emptying of the uterus, which might lead to syncope. The further course of action should depend on the condition of the woman. If it be not unfavorable, then it is wise to await the natural efforts, remaining in attendance in order to interfere actively should nature show herself unable to complete the task. The lack of contractile power in the uterus may perhaps be re-enforced by the administration of quinine by the mouth or the rectum in large doses, such as 20 grains by the mouth or 40 grains by the rectum. Often this and other measures will, however, be of no avail, and, instead of allowing the woman to pass into a state of exhaustion from the ineffectual, nagging pains, the physician should resort to such measures for emptying the uterus as are consistent with the least damage to the maternal parts. Where the cervical canal is soft and dilatable the elective accouchement described in "Obstetric Surgery" will answer admirably. In any event, it should be remembered that there is danger of uterine atony, and therefore the physician should be prepared to tampon the uterus with sterile gauze in case of hæmorrhage after delivery.

Death of the fœtus prior to the occurrence of term—indeed, at any stage of gestation—may be the associate of any of the lesions of the placenta or the membranes on which we have laid stress. It by no means follows, however, that the uterus will attempt to expel the dead fœtus. For months it may be retained, and, so long as the membranes are unruptured and sources of infection do not gain access to it, it may remain *in utero*. At times the liquor amnii is absorbed and the fœtus becomes mummified before it is shed. Again, the fœtus may slowly become macerated.

The alteration in the signs of pregnancy due to fœtal death are slow. For a time the abdomen may increase in size and the other subjective and objective symptoms may continue. This will account for instances where the dead fœtus has been shed not developed to the degree called for by the stage of gestation. As a rule, however, the abdomen gradually decreases in size, the breasts diminish, and the other signs of pregnancy either disappear or do not offer at all.

The health of the woman is only apt to be affected if she become infected and the fœtus decompose, in which event, on the recognition of the fact, the duty of the physician is to empty the uterus as soon as is feasible without inflicting unnecessary injury on the maternal parts.

Vicious Insertion of the Placenta.

We have purposely left for final consideration vicious insertion of the placenta. This is not a disease, properly so called, complicating pregnancy, and yet its occurrence impresses gestation after a fashion which renders it markedly pathological. On prompt recognition the life of the woman will often depend, to say nothing of the fact that vicious insertion of the placenta very frequently entails fœtal death.

Under normal conditions the placenta is implanted at the fundus of the uterus or to one or the other side, and may there develop without altering the physiological course of gestation. Further, when the placenta is implanted after the normal fashion the development of the uterus, in particular the changes in its lower segment, may progress without there being any interference with the growth of the placenta. The uterine mucous membrane when in a normal condition offers proper soil for the development of the ovum at any point. In case the ovum ingrafts itself at the lower zone of the uterus, or in case during the early weeks of gestation it becomes dislodged and obtains a second attachment in the lower zone of the uterus, then we have present a vicious attachment of the placenta.

Two varieties of attachment of the placenta out of the normal may occur. It may become attached and develop just above the level of the internal os or else it may become implanted over the internal os. The former is known as a marginal attachment and the latter as a central attachment. The symptomatology and the prognosis and the course of action will vary according as one or the other of these vicious insertions occur.

Marginal attachment of the placenta is not likely to give rise to symptoms until the gestation has advanced to about seven and one-half months, since, until this date of gestation has been attained, changes do not occur in the lower uterine zone which infringe on the site of placental growth. In case of central attachment, on the other hand, symptoms occur at an earlier date, since the development of the lower uterine segment of the uterus of necessity puts on the stretch the entire circumference above the level of the internal os. As the muscular fibres of the uterus increase in size, and as the uterus spreads in every direction in the course of development, it stands to reason that if the placenta does not concomitantly develop certain of its attachments are bound to yield, and thus we have the prime and the initial symptom of the vicious attachment, namely, hæmorrhage. Obviously, also, this hæmorrhage will be profuse or not, according to the degree of separation, and such separation must always be greater when the insertion is central than when it is marginal, and also earlier in occurrence. This is the reason why we have repeatedly laid stress on the fact that hæmorrhage occurring during the course of pregnancy should always be a matter of grave concern. It should always suggest the possibility of vicious insertion of the placenta, and, as will be noted, as soon as the diagnosis is established with a fair show of reason, there is but one possible course of treatment, whether we consider the woman alone, as is the case in early gestation, or both the woman and the child, as will hold in advanced gestation.

The diagnosis is not always easy, particularly in early gestation, before it is possible for the examining finger to penetrate the cervix and to reach high enough up to feel the presenting placenta. Here the diagnosis will often remain in doubt until after the uterus has been emptied and the placenta is examined. In early pregnancy—that is to say, prior to the sixth month—we shall have to proceed by a process of exclusion. Thus, we must rule out cervical polyp as a cause of hæmorrhage, and also partial separation of the placenta. Cervical polyp will be detected by touch in case it be large enough to cause sufficient hæmorrhage to justify the name. Partial separation of the placenta is apt to be associated with but slight oozing, and, if this should recur in any amount, the indication for treatment is the same as if the diagnosis of vicious implantation of the placenta had been reached. In the event of the hæmorrhage recurring prior to the seventh month of gestation, then, even though it is not possible to feel the vicious insertion, the rule will be to take steps to empty the uterus. Often, before it is possible to insert the finger into the cervical canal, the increased development of the lower uterine segment to one or the other side and the additional pulsation in this neighborhood over that which is normal will excite the suspicion of the physician. As soon as it is possible for the examining finger to penetrate through the cervix the diagnosis will be made in case of central implantation, since the finger will reach the soft, boggy, placental tissue instead of the presenting part of the fœtus. In the event of marginal attachment, the diagnosis obviously can only be certified in case it is possible to pass the finger above the internal os and to reach the lateral wall of the uterus. In case of lateral attachment, however, it is exceptional that the first hæmorrhage occurs before the seventh month of gestation, and then it is apt to be slight. The next hæmorrhage, however, may shortly follow and be more profuse; so that even in case of lateral attachment it behooves the physician to be on his guard in order to resort to the proper method of treatment before the woman has the chance to become exhausted or exsanguinated.

Hæmorrhage, then, recurring at greater or less interval, is the cardinal sign of placenta prævia. Locally, the suspicion of the physician may or may not be aroused by the abnormal enlargement and the vascularity of the lower uterine segment. The first hæmorrhage may not amount to much, but, since hæmorrhage to any degree in the course of pregnancy is abnormal, the physician should watch carefully. He may to advantage instruct his patient, after a manner which will not alarm her, that it is advisable that she should notify him in the event of there being a second flow, and that on its occurrence she should at once go to bed and remain quiet. Thus, in cases of lateral implantation, it may prove possible *to tide the woman over to term, or, at any rate, to the term of* fœtal viability,—about seven or seven and one-half months,—when, of course, we give the fœtus a chance of life, slender though it be. In the event of the hæmorrhage being at all profuse or where the physician is able to feel the placenta presenting, then it is unwise to temporize. A consultation should be called and steps should be taken to empty the uterus according to the method and in accordance with the line of argument which will be found in "Obstetric Surgery."

Under the method of treatment advocated in "Obstetric Surgery" the prognosis of placenta prævia has improved greatly over that which older methods of treatment gave. The elective emptying of the uterus enables us to save nearly 90 per cent. of the infants instead of losing this number, as was the record of the past, and the chances of the woman's life being saved may be placed at about 98 per cent. These statements apply strictly to instances where there is no temporizing with the tampon, or, worse than all, with ergot. The uterus is emptied, after dilatation by the hand, preceded, where need be, by incision of the cervix, or, where time permits, by preliminary gauze packing of the cervix to secure softening and dilatability, and the uterine tamponade is at once utilized in cases where the organ does not contract, the woman being thus spared loss of blood as far as is possible. The risk associated with these manipulations is simply septic infection, and therefore the corollary to proceed aseptically.

CHAPTER IV.

DIAGNOSIS OF THE PRESENTATION AND OF THE POSITION OF THE FŒTUS.

A PREREQUISITE to the conduct of labor is the diagnosis of the presentation and of the position of the fœtus. This information is secured through resort to abdominal palpation associated with vaginal examination. By presentation of the fœtus is understood that portion of the fœtus which endeavors to enter the pelvic inlet. By position of the fœtus is understood the relation which certain portions of the presenting part bear to certain fixed points of the pelvis.

The longitudinal axis of the fœtus may be coincident with that of the uterus, or it may occupy the transverse diameter of the organ, or it may assume a position intermediate between. The first is normal; the latter are abnormal. By means of abdominal palpation, conjoined with vaginal examination, the different presentations and positions may be differentiated, except in instances where the abdominal walls are so fat as to interfere with palpation, when vaginal examination alone must suffice. As a general rule it may be stated that, prior to labor, only the presentation may be determined, and this through palpation. In order to differentiate position it is requisite that the cervical canal shall have opened sufficiently to enable the finger in the vagina to recognize certain landmarks on the presenting part.

To properly perform abdominal palpation the woman should lie on a bed or couch, the legs flexed on the abdomen, and the abdominal walls covered by a thin sheet. The bladder should be empty. There need be no exposure of the woman, and if the reason for examination be explained it will be exceptional that she will offer any objection; indeed, she will have a higher opinion of her attendant, who is evidently taking every precaution necessary for her welfare.

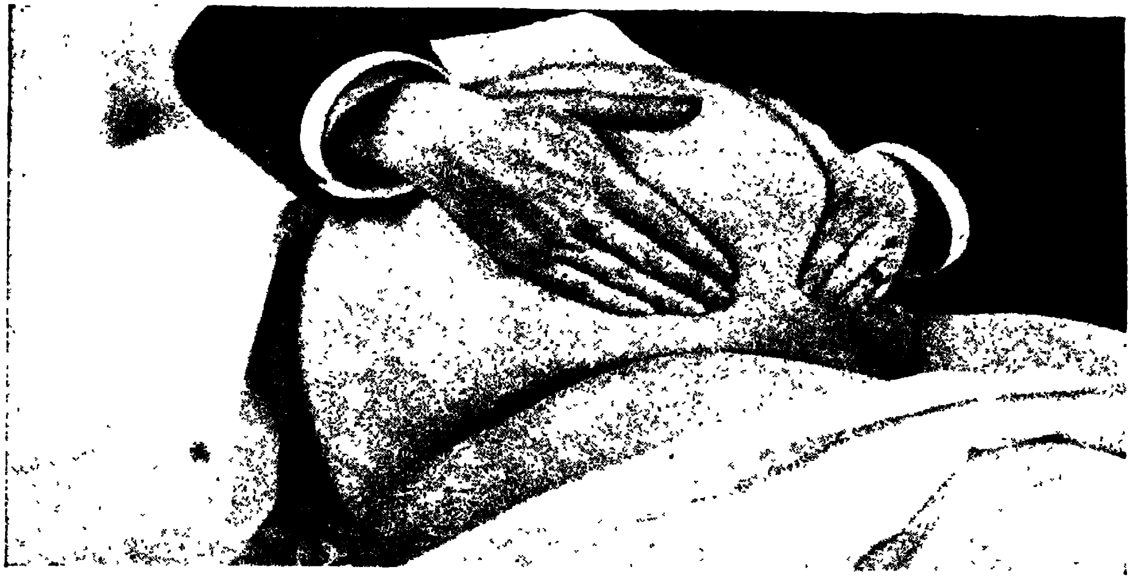
By means of percussion the outline of the uterus is determined and its height above the pelvic brim,—an approximate means, as has been noted, of determining the probable period of gestation. The flattened hands are then made to traverse the uterine tumor with the end in view of determining the direction in which the uterus is enlarged. Marked increase in the transverse diameter of the uterus will suggest that the fœtus occupies this diameter chiefly, in which event the fœtal poles, on deep palpation, will be found above the iliac crests, one above and the other below the line drawn through the centre of the uterine tumor transversely. The woman should be counseled to breathe quietly and to resist the effort to contract the abdominal muscles. The tips of the examining fingers may thus be insinuated deeply and a greater sense of resistance will be met with at one or the other side of the uterine tumor. To the touch the sensation may be one of greater hardness and the outline may be rather spherical. The inference is that the fœtal head is being palpated. If this portion be struck sharply it will ordinarily be felt to rebound from the fingers, giving the abdominal ballottement. In case the abdominal walls be thin and the gestation has advanced to about the seventh month, the palpating fingers may trace out the outline of the fœtus from this harder surface along the dorsum to the breech and may reach the fœtal small parts, usually the feet. The dorsum of the fœtus, being harder than the anterior aspect and being applied closer to the uterine walls, always yields the sensation of greater hardness. The evidence thus obtained of transverse or oblique position of the fœtus as regards the uterine axis may now be corroborated by palpation of the pelvic brim. (Plate VII, A.) The fingers of one or of both hands are applied just above the pubes and pressed downward as far as is possible. If the poles of the fœtus occupy the transverse diameter of the uterus they will not be found at the pelvic inlet unless there be multiple pregnancy, in which event corroborative evidence must be sought. In case of doubt as to whether the pelvic inlet or the space just over it be occupied or not, resort to vaginal examination will clear the diagnosis. Where the fœtus is presenting by its longitudinal axis coincident with that of the uterus, examination by the vagina will reveal the fœtal pole resting on the lower uterine segment. If this segment be not occupied and the external palpation has revealed the transverse axis of the uterus occupied by the poles of the fœtus, the inference is clear that we are dealing with a transverse presentation of the fœtus. This presentation may be directly transverse or oblique. In the former event the poles of the fœtus will be coincident with the transverse axis of the uterus; in the latter event the poles will be found just above one or the other iliac crest. Auscultation will assist in reaching a correct estimation of the position of the fœtus. Where the position is transverse, the beat of the fœtal heart will be heard above or below the umbilicus in the midline, according to the position of the dorsum of the fœtus.

The information of the transverse or the oblique presentation of the fœtus thus acquired is especially valuable, since, if detected before rupture of the membranes and in the presence of sufficient liquor amnii to allow of the procedure, external manipulation will enable us to convert it into the more favorable one of presentation of the vertex, according to the method described under "Version" in the portion of this work dealing with obstetric surgery.

The transverse or oblique presentation of the fœtus is an unfavorable one for the occurrence of normal labor, and, whenever detected, the proper efforts should be made toward converting it into the favorable one of presentation of the cephalic pole or even of the pelvic pole; that is to say, where the long axis of the fœtus corresponds to the longitudinal axis of the uterus. Under these conditions the shape of the uterine tumor is more that of a flattened sphere, the transverse diameter of the uterus not being enlarged out of proportion to the longitudinal. On palpating there will be a distinct sense of greater resistance along one side of the uterus than on the other, corresponding to the dorsum of the fœtus. (Plate VII, B.) This sense of greater resistance is noticeable mainly when the dorsum of the fœtus is applied to the anterior parietes of the uterus. When the dorsum of the fœtus is posterior the resistance will not be felt except on deep palpation, but instead the small parts of the fœtus, usually the feet, may be palpated with greater or less ease, according to the amount of adipose in the abdominal walls and the quantity of liquor amnii. The dorsum of the fœtus having been determined, by following the outline upward a hard, roundish body or a denser body not so regular in outline will be detected,—in the first instance the head and in the second the breech of the fœtus. (Plate VII, C.) If the liquor amnii be present in normal amount and the presenting part be not fixed in the pelvic brim, impulse on this part will result in the determination of abdominal ballottement. The fingers next proceed to palpate above the pubes. The bladder having been emptied, the fingers are inserted deeply above the pubes, and either a hard, spherical body is determined or else a rounder, softer mass,—in the first case the head of the fœtus, in the second the breech. If the head of the fœtus be felt just above the pelvic brim, then, by following the outline of the dorsum, the position of the breech may be readily determined; if the breech be detected above the brim, then the head will be recognized at the opposite pole. The breech can never engage prior to labor, and will, therefore, always be found above the pelvic excavation. The head of the fœtus, on the other hand, may enter the pelvic brim just prior to or at the time of labor, unless there be disproportion between the head and the pelvic inlet. By means of vaginal examination the data secured by abdominal palpation may be certified. In case the long axis of the fœtus corresponds with the longitudinal axis of the uterus, on vaginal examination either the hard head will be found in the lower uterine segment or the softer breech. In the event of the membranes not having ruptured and there being a sufficiency of liquor amnii, the presentation may be further certified by the obtaining of vaginal ballottement.

The attitude of the fœtus may be neither transverse nor longitudinal, but oblique. In this event conjoined abdomino-vaginal ex-

PLATE VII.



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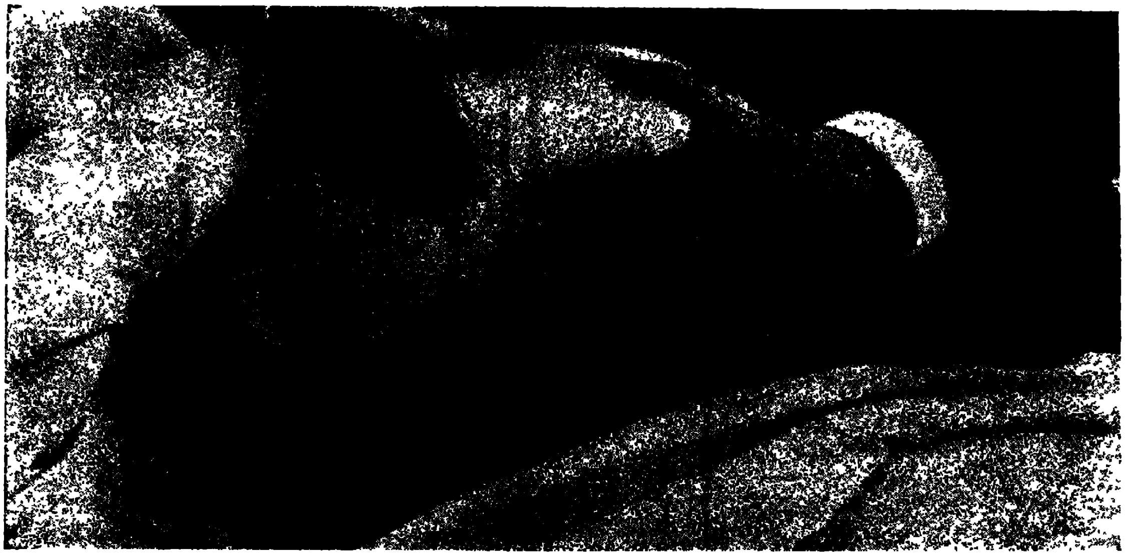

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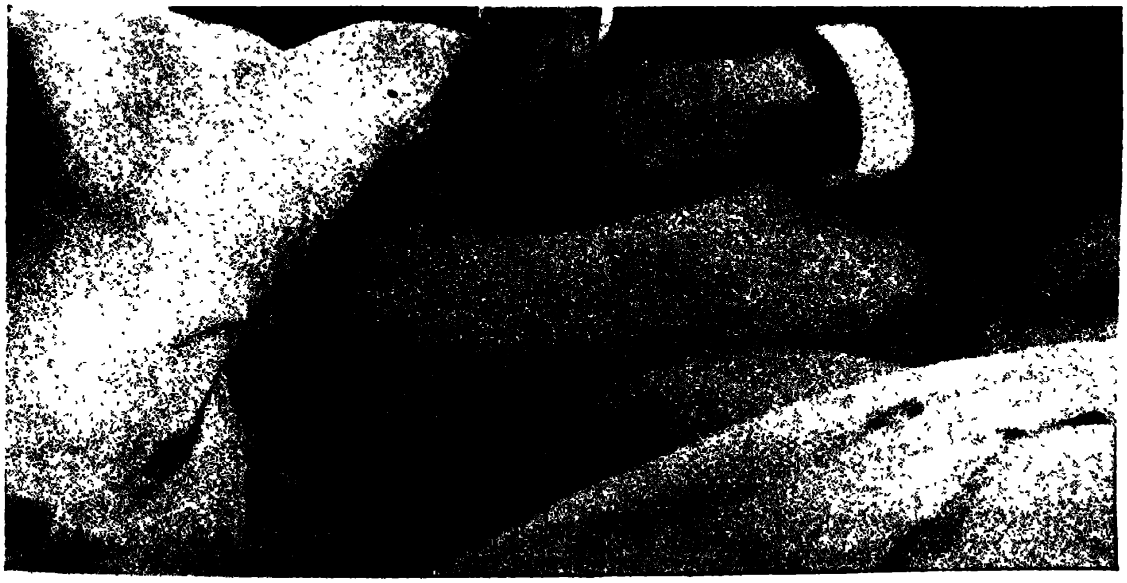


amination will aid in diagnosis of presentation. The finger being in the vagina, the fingers of the other hand palpate the space above the pubes, when to one or the other side a round body, hard to the touch, will be detected,—the head,—or a softer body less determinate in outline,—the breech. If there be a sufficiency of liquor amnii, these parts of the fœtus, by conjoined manipulation, may be brought over the pelvic inlet.

The following presentations of the fœtus may be recognized, and it is important to differentiate them as accurately as possible: Presentation of the vertex; presentation of the brow or face; presentation of the breech, complete or incomplete; presentation of the trunk.

Under the subject of "Normal Labor" we will note in detail the manner after which these various presentations may be recognized through vaginal touch. In this place the endeavor is simply to determine what information may be secured through abdominal palpation at the stage of pregnancy when the fœtal presenting part is not accurately palpable through the vagina, owing to the closure of the cervical canal.

It is essential to recall here what may be termed the obstetrical landmarks of the fœtus, since on the knowledge of these will depend the ability of the physician to differentiate presentation and variety of position.

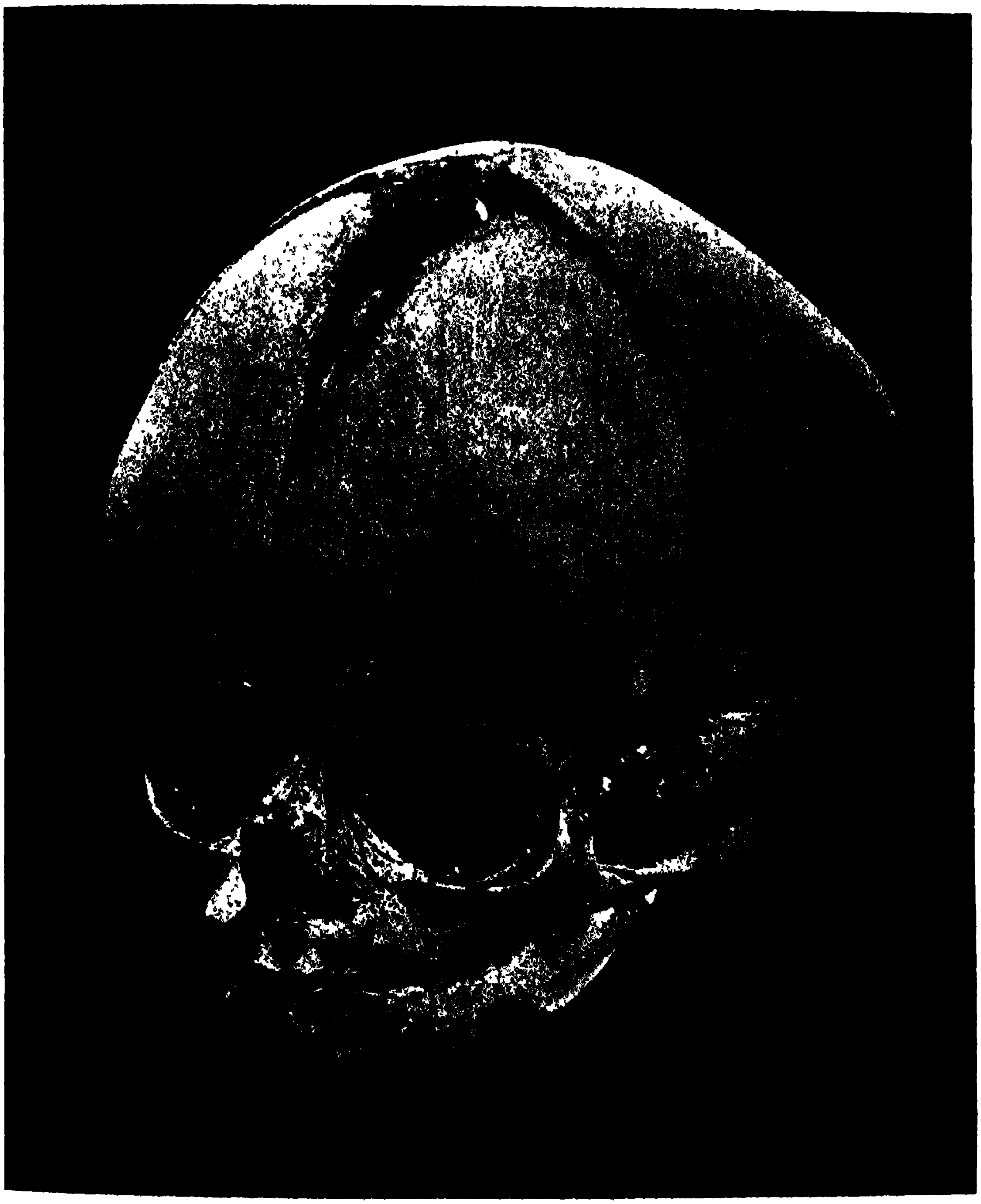
The fœtus lies in the uterus inclosed in its membranes in an attitude of flexion. In such attitude it best accommodates itself to the dimensions of the uterine cavity so as to occupy the least possible space. The trunk is flexed; the chin is applied to the sternum; the legs are flexed on the abdomen and the arms on the thorax. This leaves a free space between the upper and the lower extremities, and here the umbilical cord lies,—where it is the least subject to pressure. The shape thus assumed by the fœtus is that of an ovoid, the pelvic extremity forming the larger and the cephalic extremity the smaller end. Various theories have been advanced to explain the assumption of this attitude by the fœtus, but the most rational is that which looks upon it as simply the exaggeration of the primal curvature which exists in earliest embryonal life. In the vast proportion of instances the cephalic extremity of the fœtus is the lowest in the uterus, and such presentation is looked upon as the normal. It must be remembered, however, that, owing to the natural motility of the fœtus, it may assume any position prior to engagement of the presenting part in the pelvis. The advantage derived from early abdominal palpation, therefore, is the possibility of recognizing what are regarded as unfavorable presentations and of rectifying them into the favorable.

The fœtal head at term is ovoid in shape, its larger extremity being posterior. The bones which enter into the structure of the skull are separated by the sutures and the fontanelles. These dividing portions are of especial interest to the obstetrician, since it is through the recognition of them by vaginal touch that he is in a position to accurately picture the portion of the cephalic extremity which is presenting,—a matter which will be fully elucidated later. The fontanelles, of value from an obstetrical stand-point, are the anterior and posterior. (Plates VIII, IX, and X.) The anterior fontanelle is larger than the posterior, is quadrangular in shape, and is formed by the separation of the parietal from the frontal bones. This separation is affected by means of the frontal, the coronal, and the sagittal sutures. The anterior angle of this fontanelle is formed by the separation of the two halves of the frontal bone; the posterior angle is formed by the union of the parietals. The borders of the fontanelle are formed by the frontal and parietal bones. The quadrangular shape of the greater fontanelle and the fact that each angle may be traced into a suture enable the physician to differentiate this fontanelle, and, in consequence, he is in a position to determine which portion of the vertex is presenting or has engaged.

The posterior fontanelle is placed where the sagittal and lambdoid sutures unite. It is always much smaller than the anterior fontanelle, and in shape it is triangular. These angles are formed by the occipital and parietal bones.

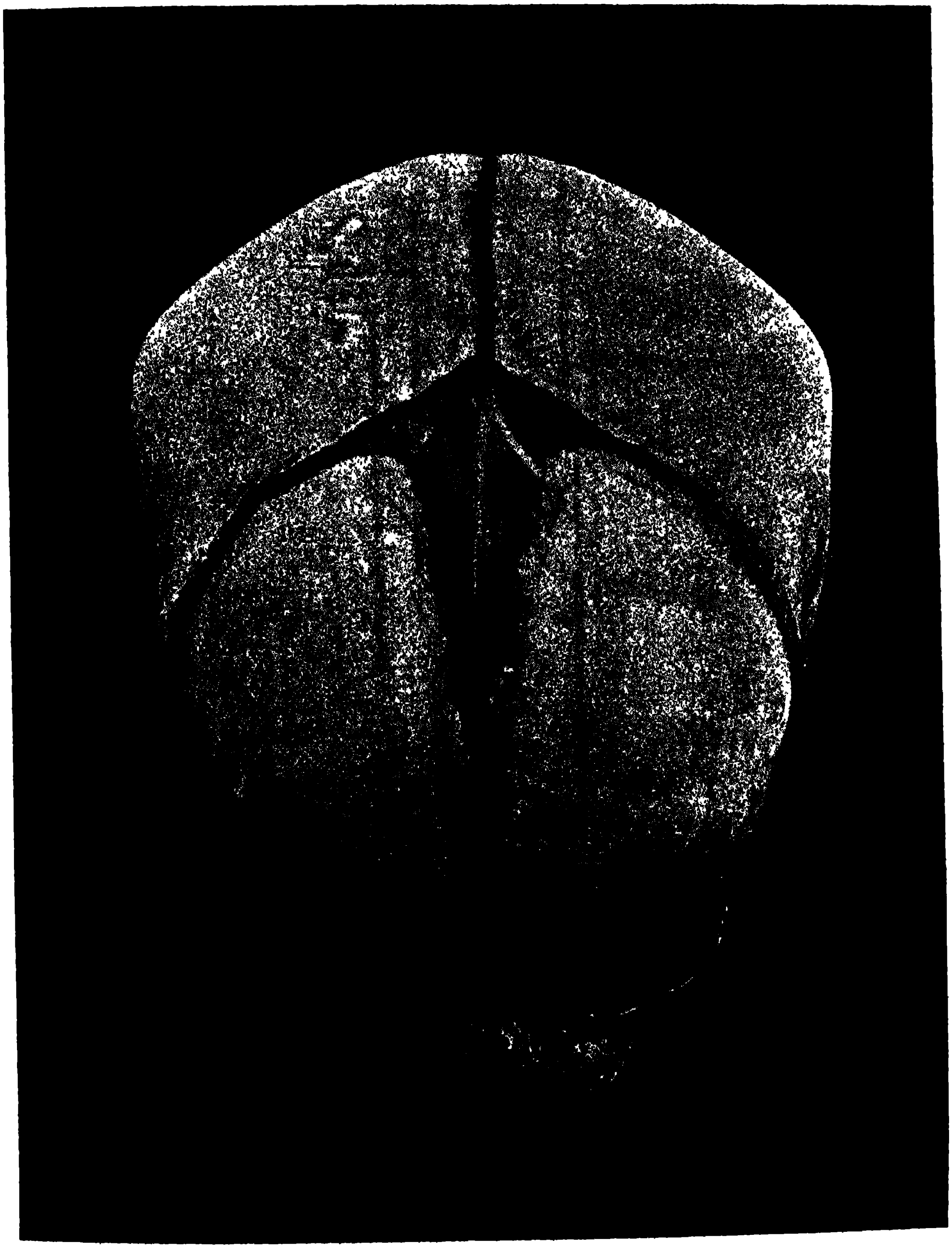
The recognition of these fontanelles is facilitated by remem-

PLATE VIII.



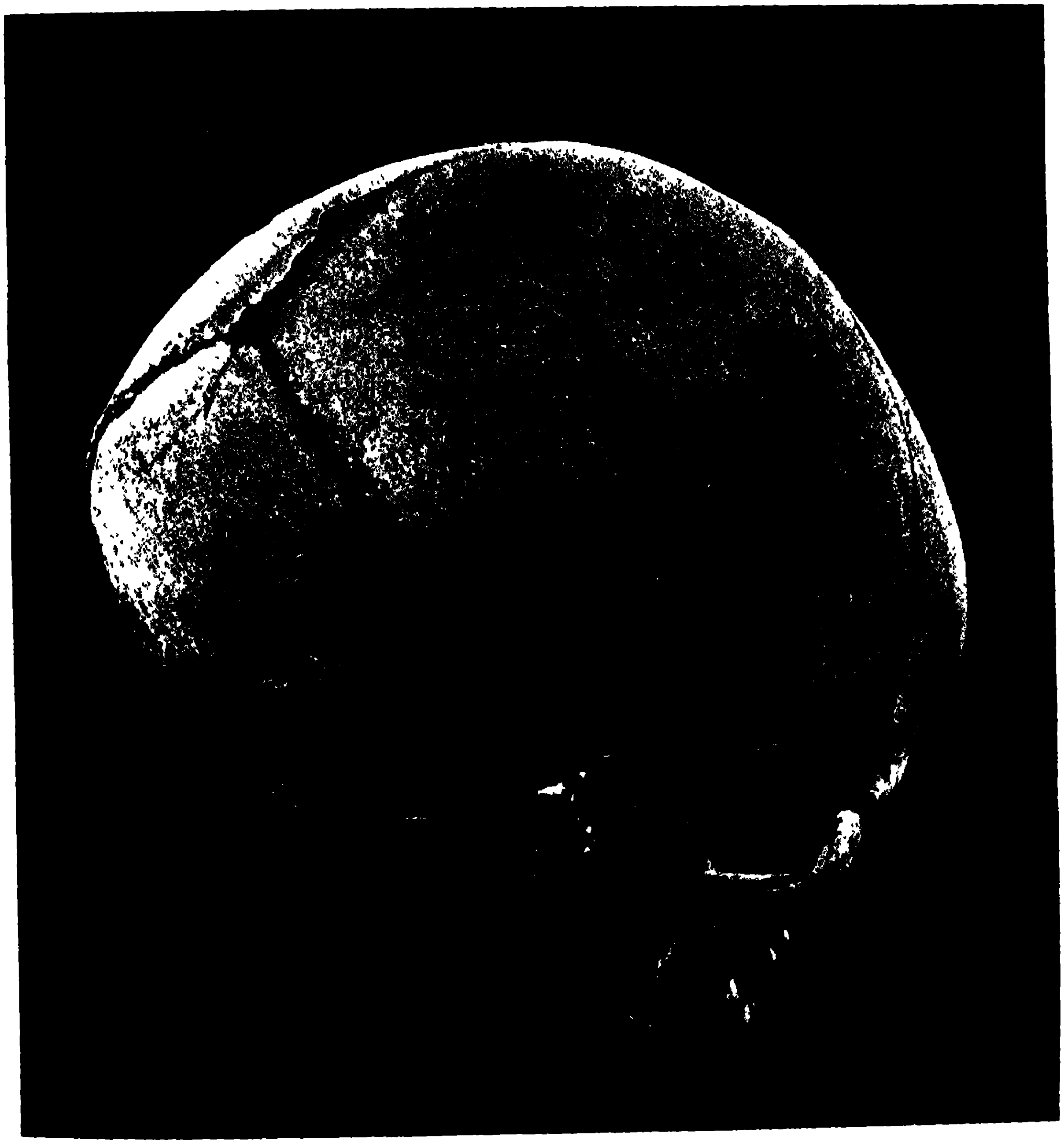
Front View of the Fœtal Skull (showing the Anterior Fontanelle and the Coronal and Frontal Sutures)

PLATE IX.



Top View of the Fœtal Skull (showing the Anterior Fontanelle and the Frontal, Coronal, and Sagittal Sutures).

PLATE X.



Posterior View of the Fœtal Skull (showing the Posterior Fontanelle and the Lambdoida and Sagittal Sutures).

bering the course of the sutures which separate the bones of the fœtal head. The sutures are four in number. The frontal suture runs between the two halves of the frontal bone. The coronal suture separates the parietals from the frontal bone. The sagittal suture extends from the frontal suture to the point where the lambdoid suture forms its apex, and crosses the coronal suture. The lambdoid suture lies between the occipital bone and the posterior borders of the parietals. These are the sutures which enter into the composition of the fœtal head and which are of importance to the physician in his capacity of accoucheur. Like the fontanelles, these sutures are of utility in determining the position of the fœtal head only after the pregnancy has advanced to that stage when the examining finger can reach the head directly through the open cervix. The sutures and the fontanelles constitute the essential obstetrical landmarks, so to speak, of the fœtal skull, but their presence in the head must be remembered in endeavoring to change position by external examination, since it is by adapting certain portions of the head to the pelvic inlet by external manipulation that we are frequently enabled to convert an unfavorable position into a favorable.

On external manipulation, the bladder having been emptied, and the abdomen of the woman being covered by a thin sheet, the palpating fingers inserted above the pubes as deeply as possible may be able—under circumstances when deep palpation is not impossible, owing to great amount of adipose in the abdominal wall or excessive amount of liquor amnii—to differentiate the hard, oval occiput from the flatter brow of the fœtus. Having determined the presentation of the occiput, just above or just below the pubes, it is a comparatively simple matter to follow out the outline of the dorsum of the fœtus along one or the other uterine wall to the upper extremity of the fœtus or the breech. Further, the presence of a sense of greater or less resistance to one or the other side of the midpubic line will enable the physician to determine whether the occiput points toward the right side or the left side of the woman,—a matter of importance, as will be noted later on in the discussion of the subject of "Labor." Absence of marked resistance above the pubes and coincident absence of a sense of greater resistance on one side of the uterus over the other also give us valuable information, in that the inference is sound that the dorsum of the fœtus lies in the posterior segment of the uterus and that either the brow or the face of the fœtus is presenting,—unfavorable presentations, as will be seen.

When, on palpation above the pubes, we do not find the fœtal head, but instead the larger, softer, more irregular outline of the breech, we are enabled—through deep palpation—to determine whether the dorsum of the fœtus is anterior or is posterior. In the one case the breech may be readily palpated in outline; in the other, the anterior face of the fœtus being applied to the uterine walls in front, we shall on palpation only be able to detect an indistinct sense of resistance above the pubes, and, following along laterally to one side or the other, we shall feel the fœtal feet or knees, except where the abdominal walls are very fat or there is an excessive amount of liquor amnii.

We have noticed that the fœtus presents either by the cephalic pole, or by the pelvic, or transversely. Under the subject of "The Mechanism of Labor" these presentations will be considered in detail. Seeing that it is important to recognize as accurately as possible the variety of presentation during pregnancy in order to alter a disadvantageous into an advantageous position, it is proper to study here in outline the main facts bearing on the subject. When the head of the fœtus presents, flexed, at the pelvic brim, we have what is known as presentation of the vertex. When the head of the fœtus presents, extended, at the brim of the pelvis, we have a presentation of the face.

The pelvic extremity may appear at the brim completely flexed, the thighs being closely applied to the abdomen and the heels resting on the nates, in which case we have a complete presentation of the pelvic extremity. The thighs and the legs may be completely extended along the ventral surface of the fœtus, in which case we have a presentation of the breech. When the thighs are flexed on the pelvis and the legs on the thighs we have a presentation of the knees. When both thighs and legs are extended we have a presentation of the feet. In case of transverse presentation,—presentation of the trunk,—either one or the other shoulder presents at the pelvic brim.

When these varieties of presentation descend vertically into the pelvis the presentation is known as regular. When, however, the descent is inclined we have varieties of each presentation. Thus, of the cephalic extremity, we have an occipital, a frontal, and a parietal presentation, according as the occiput or the frontal or the parietal bone is over the centre of the pelvic inlet. Similarly, in case of the pelvic extremity, we may have pubic, iliac, or sacral varieties of presentation. Of the trunk, we may have costal, abdominal, cervical, or dorsal.

During the course of labor, as will be noted, these irregular presentations are apt to become regular, or, if not, it is the duty of the physician in attendance to recognize and to rectify them.

The position of the presenting part of the fœtus is again, for purposes of study,—and, indeed, of practical import,—divided according as certain points of the fœtal presenting part are related to certain fixed points in the maternal pelvis.

In practice the obstetrical landmark for presentation of the vertex is the occiput; and, for presentation of the face, the forehead, or, preferably, the chin. In case of the pelvic extremity whether the presentation be complete or incomplete, the sacrum is selected as the landmark; for the knees the anterior surface of the tibia; and, for the feet, the heel or calcaneum. In case of trunk presentation, since the shoulder presents at the brim, the acromion has been selected as the landmark.

By bearing these specific landmarks in mind the physician, when he makes his local examination during labor, can tell which portion of the presenting part is offering, and can thence deduce the course of labor or of action. These are points which will be amply considered under the proper heading.

As regards the pelvis, practically it must be remembered that the presenting part of the fœtus may be turned toward any portion, but in the vast proportion of cases either the presenting part at the brim of the pelvis occupies one oblique diameter or the other. The pelvis, therefore, has been divided into two symmetrical halves,—a right iliac region and a left iliac region. The presenting part of the fœtus must occupy one or the other of these halves, and, according to the case, one or another given term is applied. Thus, in case of presentation of the vertex, the occiput is either in the left oblique diameter of the pelvic brim or in the right oblique. It may occupy a position intermediate between, but then we have simply the presenting landmark in the transverse diameter, either to the right or the left.

The diameters of the pelvis are the antero-posterior, the oblique, and the transverse. The presenting part of the fœtus always occupies at the brim either the oblique or the transverse diameter of the pelvis. The pelvic obstetrical landmarks are therefore selected in these diameters; and in the oblique diameter the ilio-pectineal eminence and the sacro-iliac synchondrosis, left or right, are taken as the extremities, and the centres of the ilium are taken as the extremities of the transverse diameters. Now, according as the prominent fœtal landmark in a given case points toward one or another of the extremities of these diameters the position is denominated after one or another manner.

Where the vertex of the fœtus presents, the occiput lies in the left or in the right iliac region and points either toward the right or the left pectineal eminence or toward the right or the left sacro-iliac synchondrosis. Therefore, we recognize the following varieties of presentation of the vertex:—

Occiput to the left, pointing toward the left ilio-pectineal line; occiput to the left, pointing to the left sacro-iliac synchondrosis; occiput to the right, pointing to the right ilio-pectineal line; occiput to the right, pointing to the right sacro-iliac synchondrosis.

In case of the face, the anatomical landmark being the chin, we recognize varieties of presentation according to whether the chin points to one or the other of these pelvic landmarks:—

Chin to the left or to the right, anterior or posterior, according to the half of the pelvis, right or left, which it occupies, and according to whether it points to the right or the left pectineal eminence or to the right or the left sacro-iliac synchondrosis.

In case of the pelvic extremity, the sacrum being taken as the landmark, we speak of left or of right sacro-iliac anterior or posterior position, according to whether the breech presents in the right or the left half of the pelvis and points toward the left or the right pectineal line or sacro-iliac synchondrosis. In case of the trunk, the shoulder being taken as the landmark, we speak of the left or right anterior or posterior position of the shoulder, according as it presents in the right or the left half of the pelvis and points toward the left or the right ilio-pectineal line or the right or the left sacro-iliac synchondrosis.

In practice these varieties of presentation are denominated thus:—

VERTEX.

L. O. A.,	Left occiput anterior.
R. O. P.,	Right occiput posterior.
L. O. P.,	Left occiput posterior.
R. O. A.,	Right occiput anterior.

The intermediate positions are known as O. T. L. or O. T. R., according as the occiput points toward the centre of the left or the right ilium.

FACE.

M. L. A.,	Mento-left anterior.
M. R. P.,	Mento-right posterior.
M. L. P.,	Mento-left posterior.
M. R. A.,	Mento-right anterior.

The intermediate positions are known as M. L. T. and M. R. T., according as the chin points toward the centre of the right or the left ilium.

BREECH.

S. L. A.,	Sacrum left anterior.
S. R. P.,	Sacrum right posterior.
S. L. P.,	Sacrum left posterior.
S. R. A.,	Sacrum right anterior.

Only in case of exceptionally large pelvis or very small child can the sacrum point toward the middle of one or another ilium; so that practically such positions need not be taken into account.

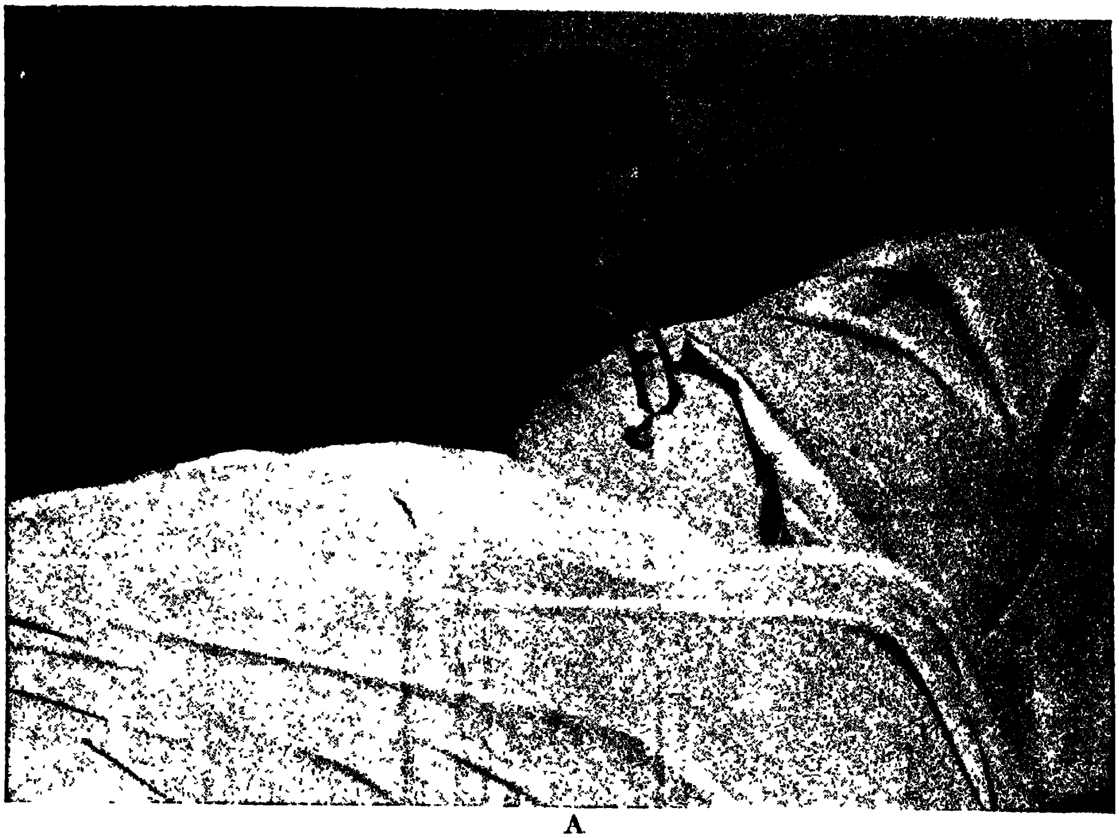
TRUNK.

Presentations of the trunk are differentiated according as the right or the left shoulder points toward the right or the left sacro-iliac synchrondrosis, the dorsum being anterior or posterior. In practice it makes no difference, since we are dealing with a presentation which cannot be delivered by nature short of the occurrence of what is termed spontaneous evolution, but always requires otherwise the interference of the physician. These presentations and the method of dealing with them will be fully discussed under the subject of "The Management of Abnormal Labor."

The presentations and the positions which we have considered not uncommonly alter during pregnancy and frequently during labor. During pregnancy, where the liquor amnii is present in normal amount, the fœtus is capable of considerable motion prior to engagement of the presenting part; and during labor, under the influence of the uterine contractions and in obedience to the configuration of the pelvis, the presenting part changes in position, usually, fortunately, after a fashion which best favors delivery. After an understanding of the mechanism of labor the student will be in a position to appreciate the reasons for these changes and the effect they have on the course of labor.

A further aid, and a very valuable one where the conditions are favorable for diagnosticating the presentation and the position of the fœtus, is yielded us by auscultation. The fœtal heart is situated nearer the cephalic extremity than the pelvic. As we have

PLATE XI.

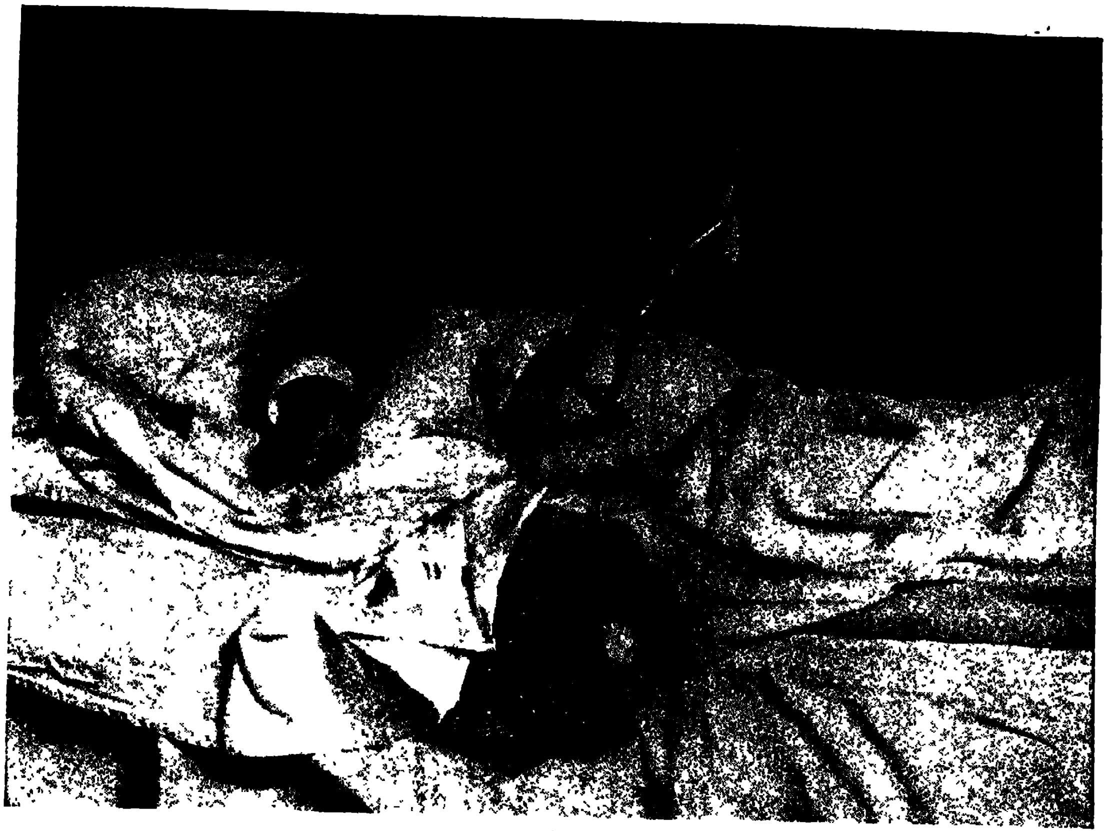


A

B

A. Site of Maximum Intensity of the Fœtal Heart-sounds in Presentation of the Vertex

PLATE XII.



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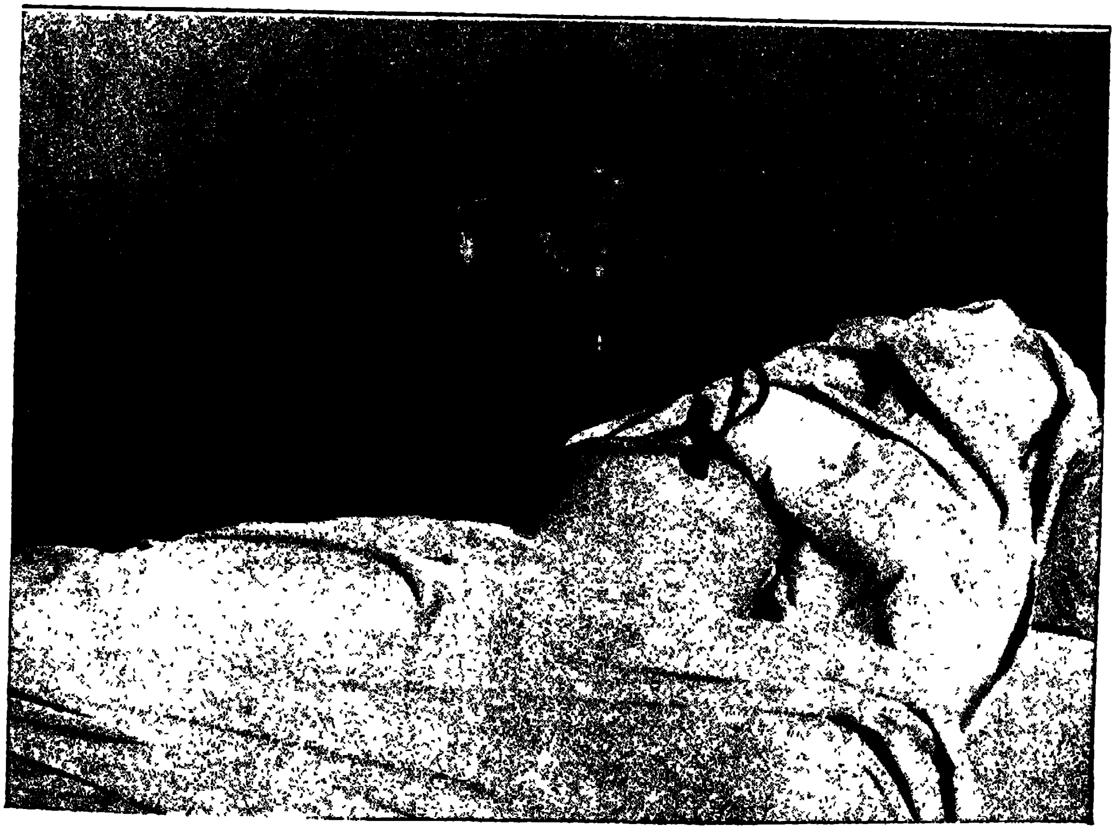


B

A. Site of Maximum Intensity of the Fœtal Heart-sounds in Presentation of the Vertex. Position, Right Occiput Posterior

noted, the posture of the fœtus in the uterus is one of anterior flexion, and therefore the sounds of the fœtal heart are best transmitted through the back of the fœtus. Where the fœtus is presenting by the cephalic extremity, the fœtal heart-sounds must necessarily be heard with greatest intensity below a line which divides the uterus about its middle portion. In case the pelvic extremity is presenting, the heart-sounds will be heard above this line. In practice, therefore, when the fœtal heart is heard below the umbilicus the inference is safe that the presentation is one of the cephalic extremity, and the reverse holds true for the pelvic extremity.

A convenient way of remembering where to listen for the fœtal heart under different presentations and positions is the following: Imagine the uterus divided by a line drawn vertically through it and passing through the umbilicus. Bisect this line by a second at the umbilicus. This divides the abdomen into four equal quarters. In one or another of these divisions the fœtal heart will be heard with maximum intensity, according as the presentation is of one or the other variety. Thus, as will be further elucidated under the subject of the " Mechanism of Labor ": In case of presentations of the vertex the heart-sounds will be heard in the left or in the right lower segments, according as the back of the fœtus occupies the left or the right segment of the uterus. (Plate XI, A and B.) In case of breech presentations the heart will be heard in the left or the right superior segments, according as the back of the fœtus lies in the left or the right segment of the uterus.

For the vertex we seek the heart-sounds along a line connecting the umbilicus and the left or the right anterior superior spine, according as the position is left or right anterior. In case of posterior positions of the vertex the maximum intensity is posterior to these lines. (Plate XII, A.)

In case of the breech the heart-sounds are heard where the positions are anterior, to the left or the right of a line extending through the centre of the umbilicus to the centre of the last rib. The sounds are discernible behind these lines to the left or the right, according as the position is left or right posterior. (Plate XII, B.)

In case of presentations of the face the heart-sounds are heard with maximum intensity in the same localities as in case of presentation of the vertex.

In case of transverse presentations, where the dorsum of the fœtus is anterior, the point of maximum intensity is apt to be below the umbilicus, near a line drawn transversely through it to the left or the right, according as the head of the fœtus is to the left or the right.

Of subsidiary importance in the diagnosis of position is the point where the woman usually feels the movements of the fœtus in the given case. These movements are often due to motion of the small parts, in particular the feet, at times direct impact being felt. When the occiput is to the woman's left side motion will often be felt to the greatest extent in the right upper uterine segment, where the feet are, and *vice versâ*. In case of presentation of the pelvic extremity, motion due to movement of the feet will be appreciated by the woman below the umbilicus to the left or to the right, according as the breech is to the woman's left or right.

Information thus acquired carries by itself but very little weight, but may be utilized as corroborative of information in regard to presentation acquired through palpation and auscultation.

In case of multiple pregnancy, the hearing of two or more fœtal hearts differing in rhythm and of different intensity at different parts of the abdomen, particularly if these sounds are heard by independent observers, will lead to the strong presumption that there exists more than one fœtus.

PART II.—Labor.

MECHANISM OF LABOR.

THE CLINICAL COURSE OF LABOR.

MANAGEMENT OF NORMAL AND ABNORMAL LABOR.

CARE OF THE NEWBORN INFANT.

CHAPTER V.

MECHANISM OF LABOR.

A THOROUGH understanding of the mechanical phenomena of labor must precede the study of its course and its management. Labor may be defined as the effort of certain expelling forces to overcome certain resisting forces. The chief expelling force is furnished by the uterus. The resisting forces which constitute the obstacle to be overcome are offered by the pelvis and its floor and by the fœtus,—the body which it is the aim of the uterus to drive into the world. In great part labor is the result of muscular contraction and of muscular relaxation. One set of muscles contract and relax (the uterine) and another set yield or relax (those of the pelvis and of the pelvic floor). Furthermore, the shape of the fœtus and the amount of compressibility it is amenable to must be considered, for were it not for certain movements which it executes the fœtal body could not be made to adapt itself to the mechanical forces by which it is gradually propelled along the pelvic canal and thence out of the pelvic outlet.

As we have noted, the fœtus at term lies in the uterus, under normal conditions, in a state of flexion, surrounded by its membranous envelopes and floating in a greater or less amount of water, which subserves the double purpose of acting, through the membranes, as a dilating wedge and also of protecting the fœtus from injury from the application of a direct muscular power to its surface. During the course of pregnancy coincident with the growth of the fœtus the uterus not only enlarges in bulk, but also in each individual muscular fibre; so that, at term, we have a body which, properly re-enforced by the action of the abdominal muscles, is, under normal conditions, competent to drive its contents down through the pelvic canal and out into the world. We have seen that during the whole course of pregnancy the uterine muscle alternately contracts and relaxes. As pregnancy approaches nearer to term these intermittent contractions become more appreciable and recur at more frequent intervals, until, finally, they merge, as it were, and, under their influence, the lower uterine segment opens at the cervix and the fœtus is allowed to descend toward the pelvic outlet. These contractions of the uterus are strictly involuntary, and they constitute the efficient cause of labor. When the uterus has expended its force and has succeeded in opening the way through its cervix, then the abdominal muscles are called into play and assist in completing delivery. The effect of the contractions on the uterus is to harden it, whereby it alters both in shape and in position. The transverse diameter of the organ becomes shorter and its antero-posterior longer; it approaches nearer the anterior abdominal wall. During the period of relaxation the uterus returns to its previous shape and consistency. These periods of relaxation are necessary in order that the circulatory process may not be interfered with, and in order to enable the muscular fibres to regain tone. Were the contractions continuous the result would be spasm of the muscular fibre instead of relaxation. During each contraction the contents of the uterus are driven downward, the result being that the water in which the fœtus floats forms a wedge at the lowest portion of the membranes, and this wedge assists in forcing the muscle of the lower uterine segment to relax. As the uterine contractions increase in frequency and in duration, the total result is the gradual opening of the cervix, whereby the fœtus is enabled to enter the vagina. It is then that the abdominal muscles are called into play. The contractions cease to be involuntary. The woman must help herself through expulsory effort. The involuntary contractions of the uterus having opened up the cervix, the resistance to be overcome now is that offered by the walls of the pelvis and the pelvic floor, in addition to that offered by the fœtus itself, which must be made to adapt itself to the shape and the dimensions of the canal through which it must pass.

The canal through which the fœtus must pass is formed by the pelvis and the pelvic floor. The pelvis is divided, from an obstetrical stand-point, into a superior and an inferior portion. The superior portion of the pelvis constitutes what is termed the pelvic inlet, and, except where it is deformed to a considerable degree, it does not interfere with the passage of the child. The dividing line between the superior and the inferior pelvis is the linea ilio-pectinea.

In order to appreciate the mechanism of labor we must study the characteristics of these portions of the obstetric pelvis, chiefly what are known as its straits and its planes:—

STRAITS OF THE OBSTETRICAL PELVIS.

There are two straits,—the superior, or that of the inlet, and the inferior, or that of the outlet.

The superior strait is oval in shape, and when the woman is in the erect posture its plane is an oblique one, the direction being from behind forward and from above downward. It follows that the axis of the pelvic inlet is not in a line with the abdominal cavity, the inclination of the plane of this strait being about sixty degrees. The axis of the superior strait being a line perpendicular to the centre of its plane, if prolonged upward and forward it will emerge in the abdominal wall at a point a trifle below the umbilicus, and, if prolonged downward and backward it meets the anterior face of the coccyx about midway from the tip of the organ. The importance of remembering the direction of this axis is obvious, since, in order to enter the pelvis the fœtus must accommodate itself to this line of the pelvic inlet. (Plate XIII.)

The circumference of the superior strait varies, within normal limits, between thirteen and sixteen inches. There are three diameters of obstetrical import: The antero-posterior, or sacro-pubic, extending from the upper edge of the pubic symphysis to the centre of the sacro-vertebral angle, and measuring, on the average, four and one-half inches. The transverse diameter, extending from the centre of the innominate line of the one side to that of the other, and measuring about five inches. The right and the left oblique diameters, extending from the pectineal eminence of each side to the sacro-iliac synchondrosis, and measuring from four and one-half to four and three-fourths inches.

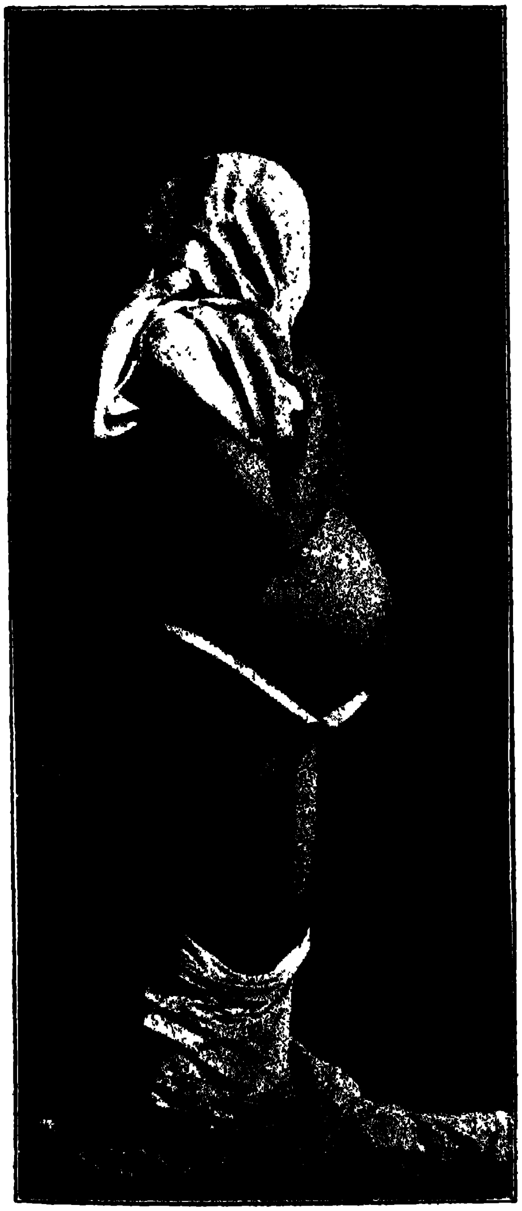
The inferior strait is formed by two triangles, the common base of which is the line uniting the ischiadic tuberosities. The apex of the anterior triangle is at the tip of the coccyx. The circumference of the inferior strait is uneven, which is owed to the projection of the coccyx and the tuberosities of the ischium and the depressions formed by the pubic arch and the edges of the greater sacro-sciatic ligaments.

The plane of the inferior strait extends from the tip of the coccyx to the subpubic point. It is only in labor that this plane assumes importance, and then it alters owing to the recession of the coccyx under the pressure of the fœtal head. When the woman is in the recumbent posture, as she is apt to be in labor, the inclination of this plane is from above downward and from in front backward. The axis of the inferior strait, when prolonged upward and forward, meets the axis of the superior strait at the centre of the pelvic cavity, and, if it be prolonged beyond, will end at the sacro-vertebral junction or a trifle above this point. When prolonged backward and downward the axis of the inferior strait meets the pelvic floor just anterior to the anus. When a woman is in the dorso-recumbent position the axis points almost directly forward. (Plate XIII.)

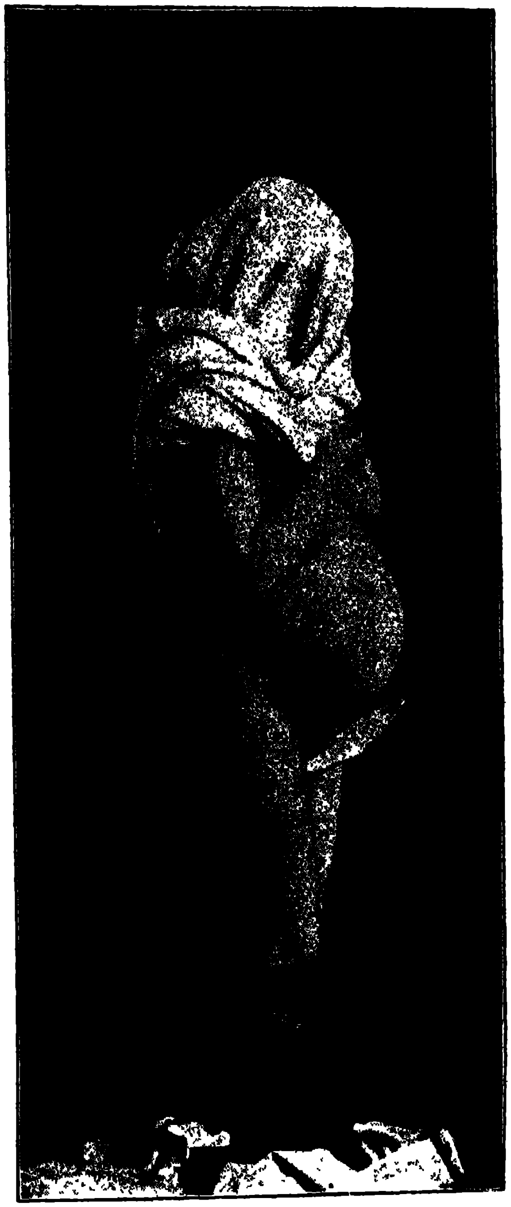
In the normal pelvis the diameters of the inferior strait measure about four inches, but during labor, owing to the recession of the coccyx and the yielding of the sacro-sciatic ligaments, there is a gain of about one-half inch.

Intermediate between the superior and the inferior straits lies the cavity. The fœtus, having entered the superior strait, must undergo certain changes in position and in shape in the cavity before it can engage normally at the inferior strait. The shape of the cavity of the pelvis varies greatly within normal limits, since it is dependent on the curve of the sacrum and the coccyx, and this is different in each woman. It follows, therefore, that we cannot properly speak of an axis of the pelvic cavity, for we are not dealing with a straight line, but with a curvilinear. The direction which

PLATE XIII.



The Plane and the Axis of the Superior Strait, or Pelvic Inlet.



The Plane and the Axis of the Inferior Strait, or Pelvic Outlet.

the fœtus must follow in order to reach the pelvic outlet is a curved one. We may define the axis of the cavity as being a curved line passing through the centre of the true pelvis, at all parts being equidistant from the sacrum and the pubes. Along this line, from inlet to outlet, the fœtus passes in order to enter the world.

The diameters of the cavity, with their average measurements, are: The antero-posterior, which extends from the middle of the posterior surface of the symphysis to the junction of the second and third sacral bones, and which measures, on the average, about four and one-half inches; the transverse diameter, which extends from about the middle of each side of the cavity, crossing the antero-posterior at a right angle and measuring about four and one-half inches; the two oblique diameters, which extend from the centres of the great sciatic foramina to the posterior face of the subpubic grooves on each side and measure about four and one-half inches.

The fœtus, having entered the superior strait and engaged in the cavity, meets with resistance at the pelvic floor, which it must overcome in order to emerge at the pelvic outlet.

It will be remembered that the pelvic floor is richly supplied with fascia which interlaces the muscular structure, giving this floor great resistance as well as great distensible power. The muscles, which are of importance from an obstetrical stand-point, are few in number and are conjoined in a central raphé, so that the pelvic floor can yield to applied pressure not alone laterally, but also from before backward, as is essential in order to allow the fœtal presenting part to emerge at the outlet of the pelvis. These muscles are, in brief, the following: The levator ani, the constrictor vaginæ, the ischio-coccygeus, and the ischio-cavernosus. Through the relaxation of certain of the muscular fibres of these muscles and through the contraction of others, the lower pelvic diaphragm is enabled to open in order to give exit to the fœtal presenting part.

These muscles and the fascia are pierced by three openings,—the anal, the vulvar, and the urethral. The muscles we have noted not only clothe the pelvic floor, as it were, but they also surround, in a measure, each of these openings, acting both as constrictors and relaxors. It is important to remember the points of attachment and of origin of these muscles, and they are as follow: The levator ani and the ischio-coccygeus is a double symmetrical muscle, attached in front, on the internal surface of the body of the pubes, close to the symphysis, to the posterior surface of the horizontal rami of the pubes, to the ischiatic spine, and to the anterior surface of the lesser sciatic ligament. From these attachments the fibres radiate to a central fibrous raphé which extends from the coccyx to the rectum, being attached to the lateral walls of the rectum, to the lateral walls of the vagina, and to those of the bladder. The fibres passing from the sciatic spine and the sciatic ligament to the coccyx constitute the ischio-coccygeus muscle, and form the posterior fasciculus of the levator ani.

The sphincter ani is a muscle surrounding the lower extremity of the anus, and extending from the tip of the coccyx to the posterior portion of the rectum. It encircles the rectum, the anterior fibres decussating—those from the right passing to the left, and *vice versâ*—and uniting to form the constrictor vaginæ. This muscle, the constrictor vaginæ, surrounds the urethra anteriorly and extends to the clitoris, joining the fibres of the ischio-cavernosus. The constrictor vaginæ and the sphincter ani, therefore, form a figure-of-8.

The transversus perinei consist of a pair of symmetrical muscles. They originate from the anterior surface of the ischiatic tuberosities and, passing into the space between the vulva and the anus, blend there with the sphincter ani and the constrictor vaginæ. The ischio-cavernosa are symmetrical muscles extending from the ischiatic tuberosities and the ischio-pubic rami, surrounding the root of the clitoris and merging with the upper attachment of the constrictor vaginæ.

Such, in brief, are the constituent parts of the pelvic floor. The force essential to overcome the resistance of the pelvic floor is furnished chiefly by the contractions of the abdominal muscles, aided by the bearing-down effort of the woman, whereby, of course, the intra-abdominal pressure is increased. These forces are largely dependent on the volition of the woman and are intermittent in action,—a very necessary factor, it will be noted, in order to prevent undue pressure on the pelvic floor of a continuous nature, which could but result in injury.

The pelvic floor measures, on the average, from the tip of the coccyx to the anus one inch and three-fourths, and from the anus to the vulva one-fourth of an inch. As the presenting part emerges at the pelvic outlet the relaxation and retraction of the muscles and the fascia are such as to give a measurement of about five inches from the coccyx to the posterior margin of the outlet.

Having considered the nature of the expellent forces and the resistance to be overcome which is offered by the pelvis and the pelvic floor, it remains to note the configuration, from an obstetrical point of view, of the fœtus, which must pass from the uterine cavity out at the outlet.

The fœtal head is the portion of the fœtus which presents the greatest mechanical obstacles in its passage through the pelvis, and therefore it is important to understand its configuration thoroughly. The fœtal head, in shape, is oval, being composed of the face and cranium, its larger extremity being posterior. Eight bones enter into the composition of the cranium,—the occipital, frontal, ethmoid, sphenoid, two temporals, and two parietals. The frontal bone in front, the parietal and the squamous plate of the temporal laterally, and the occipital bone posteriorly form the vault of the cranium. Its base is composed of the sphenoid, the ethmoid, the petrous portion of the temporal, and the basilar portion of the occipital bone. The bones which enter into the composition of the vault of the cranium are separated from each other by the sutures and the fontanelles. The result is that there exists not alone considerable motion between these bones, but there is room for considerable compressibility.

The sutures of obstetrical interest are the sagittal, coronal, and the lambdoidal. The sagittal extends from the middle of the coronal suture to the apex of the lambdoidal. It separates the parietal bones. The coronal suture divides the parietals from the frontal, and is intersected at its middle by the sagittal suture. The lambdoidal suture lies between the occipital bone and the posterior borders of the parietals. The extremities of this suture lie at the squamous plate of the temporal bone, and its apex is at the posterior end of the sagittal suture. As will be noted, since the head of the fœtus is subject to compression as it passes through the pelvis, these sutures project, from the sliding of the bones on one another. In this way the dimensions of the fœtal head are diminished in certain of the diameters and are increased proportionately in others. The determination of the direction of these sutures enables the examining finger to become cognizant of the portion of the fœtal head which lies in one or another part of the pelvis.

The presence of the fontanelles enables the head of the fœtus to be further compressed as it passes through the pelvis, and the recognition of one or the other fontanelle of obstetrical significance teaches that one or another portion of the head occupies one or another part of the pelvis. We distinguish the greater and the lesser fontanelle, as has been stated, and it is important to bear in mind the characteristics of each. To recapitulate: the greater fontanelle is quadrangular in shape, and is bounded by the borders of the frontal and the parietal bones. The anterior angle is formed by the separation of the halves of the frontal bone; the posterior angle is formed by the junction of the parietals; the lateral angles are formed by the divergence of the frontal from the parietal on each side. At each angle a suture terminates, and this characteristic, together with the quadrangular shape, enables the finger to readily recognize this fontanelle. The smaller and posterior fontanelle occupies the point where the sagittal and the lambdoidal sutures unite. In shape this fontanelle is triangular, the angles being formed by the parietals and the occipital bone.

The circumference and the diameters of the fœtal head are of prime importance, since on their adaptability to the pelvis depends the emergence of the fœtal head at the outlet. The importance of the diameters increases with the degree in which the configuration of the pelvis differs from the normal, as is amply exemplified in the portion of this work dealing with the surgery of obstetrics. The chief diameters of the fœtal head, with their measurements, are :—

The occipito-frontal, extending from the occipital protuberance to the root of the nose, measures about four and three-fourths inches.

The occipito-mental, extending from the occipital protuberance to the chin, measures about five and one-fourth inches.

The cervico-bregmatic, extending from the posterior border of the anterior fontanelle to a point midway between the occipital protuberance and the occipital foramen, measures three and three-fourths inches.

The fronto-mental, extending from the top of the forehead to the chin, measures three and one-fourth inches.

The suboccipito-bregmatic, extending from the occipital protuberance to the centre of the anterior fontanelle, measures three and one-fourth inches.

The biparietal, extending from one parietal protuberance to the other, measures three and three-fourths inches.

The bitemporal, extending from the centre of the temporal bone on one side to the other, measures about three inches.

The bimastoid, extending from the mastoid process of one side to that of the other, measures about three inches.

A further point about the fœtus, of interest in connection with the mechanism of labor, is the manner after which its head is articulated to the spinal column. This articulation is of such a character that when, under the influence of the uterine and abdominal contractions, the head enters the pelvis, it is in a position of flexion,—the position so necessary, as will be noted, in order that the favorable diameters of the fœtal head may become applied in the favorable diameters of the pelvis. The articulation to the spinal cord is such that the portion of the head anterior to the foramen magnum represents the long arm of a lever; in consequence, when, under normal conditions, the head enters the pelvis, the forces being equally distributed anteriorly and posteriorly, the head flexes on the sternum.

The mechanism of labor differs in detail according to the presentation, although in general the fœtus performs a series of evolutions each of which tends to facilitate its passage from the uterus through the pelvis. These movements are : flexion, descent, internal rotation, extension, external rotation or restitution, and complete delivery.

We have already noted that the attitude of the fœtus in the uterus is one of flexion, this attitude being the one under which the fœtus best accommodates itself to the capacity of the space in which it lies. Under the influence of uterine and abdominal action this flexion becomes intensified until the presenting part reaches the pelvic floor, when, in order to facilitate delivery, the fœtus undergoes the movements of rotation and of extension. Flexion and descent assist in the engagement of the presenting part in the superior strait; when the presenting part reaches the floor of the pelvis rotation occurs in order to bring the most favorable diameters of the fœtus into the most favorable diameters of the cavity and of the outlet of the pelvis. In order to emerge at the outlet the presenting part must extend to a greater or less degree in order to bring into the antero-posterior diameter of the outlet—the widest diameter—the diameters of the presenting part which can best be there accommodated. External rotation is essential in order that the portion of the fœtus yet in the pelvis may, in turn, present its most favorable diameters to those of the cavity and of the outlet of the pelvis.

Whilst, normally, the general mechanical scheme is the same for all varieties of presentations, the mechanism varies in certain respects with each position, and, therefore, it is essential to consider tersely the mechanical phenomena of each.

Because of their greater frequency, we first study the mechanism of presentations of the vertex.

The vertex may present at the superior strait in one of four positions denominated as follows : Left occiput anterior (L. O. A.), right occiput anterior (R. O. A.), left occiput posterior (L. O. P.), and right occiput posterior (R. O. P.). Prior to descent intermediate positions are possible, such as transverse, pubic, and sacral; but since, in order to descend, the vertex must assume one of the four positions noted, except where we are dealing with an abnormally large pelvis or an unusually small fœtus in relation to the given pelvis, it is only necessary to remember these positions and to study their mechanism.

L. O. A. Position (*Occiput to the Left and Anterior*).—The diagnosis of the position is established by palpation, auscultation, and vaginal touch.

On palpation, when the attempt is made to grasp the head at the superior strait, a greater sense of resistance is determined to the right of the midline. This is due to the fact that the forehead lies here, flexion of the chin on the sternum of necessity making the forehead more prominent here when the occiput lies to the left of the pelvis and anterior. The palpating hands will hence be able to map out a greater sense of resistance along the left anterior surface of the uterus, where the back of the fœtus lies. The small parts of the fœtus will be found occupying the right upper uterine segment.

On auscultation, since the back of the fœtus is applied to the left anterior uterine segment, and since the fœtal heart occupies a position nearer the cephalic pole of the fœtus than the pelvic pole, the fœtal heart-sounds will be heard below the umbilicus in a line extending from the left anterior superior spine to the umbilicus.

Vaginal touch only yields information of value after the cervical canal has dilated sufficiently to enable the finger to reach the presenting part, and often not until the membranes have ruptured. The finger reaches the head and determines the sagittal suture. This suture is recognized by remembering that at its extremities are the fontanelles, the anterior fontanelle in the position we are now considering being found behind and to the right, and the lesser fontanelle being found in front and to the left. The sagittal suture, therefore, lies in the left oblique diameter of the pelvis, which is the diameter extending from the left ilio-pectineal eminence to the right sacro-iliac synchondrosis.

Under normal conditions the head does not become perfectly flexed until the membranes have ruptured; that is to say, descent does not begin. Under the influence of the uterine contractions the cervix opens and the fœtus is forced down into the superior strait. Flexion and descent are practically coincident, and the vertex enters the superior strait with its plane nearly coincident with that of the strait. The chin being flexed on the sternum, the sagittal suture may be traced in the left oblique diameter of the strait. The vertex thus descends to the pelvic floor. Normally, during descent, the vertex is nearly perpendicular; that is to say, the parietal eminences are in the same plane. When, however, the head enters the cavity and approaches the pelvic floor, the anterior parietal eminence—in this position the right—sinks lower than the posterior; so that this eminence, instead of the sagittal suture, will be determined in the left oblique diameter of the pelvis. When the head reaches the pelvic floor rotation occurs. The result of rotation is that the occiput is brought to the front; that is to say, the chin remaining flexed on the sternum, the round occiput glides along the left antero-lateral plane of the cavity of the pelvis until it looks toward the pubes, the forehead and the chin looking toward the sacral concavity. The cervico-bregmatic diameter of the head is thus brought into apposition with the antero-posterior diameter of the outlet; that is to say, a measurement of about three and one-half inches is applied to one about four and one-half. The biparietal diameter occupies the transverse of the pelvis, or a measurement of about three and one-half inches is opposed to one about four and one-fourth inches. It will be noticed that the head rotates into this favorable position for the reason that further descent is impossible otherwise, and, since the occiput has all along pointed to the left and anteriorly, the natural motion for it to make is from the left toward the front. In acquiring this position the fœtal neck is twisted to a degree, for the body of the fœtus, being still in the uterus and grasped by its contracting walls, does not rotate, the shoulders remaining in the oblique diameter of the superior strait.

As the contractions of the uterus, aided now by those of the abdominal muscles, in great part, increase, the occiput, or short lever of the head, descends—flexion of the chin on the sternum becoming exaggerated—until the neck of the fœtus gets under the

PLATE XIV.

Presentation of the Vertex. Left Occiput Anterior.

Presentation of the Vertex. Right Occiput Anterior.

pubic arch. Further descent of the occiput is now impeded, and, since the expelling force is still in action, the effect is applied to the anterior lever, and the chin leaves the sternum or the head extends. The floor of the pelvis bulges greatly, its muscles relaxing laterally and retracting backward, and gradually the forehead, the face, and the chin sweep over the perineum into the world.

We have seen that in the movement of rotation the neck of the fœtus necessarily becomes twisted. As soon as the head is born the neck untwists and the occiput turns toward the left of the woman,—the position it originally occupied. This movement is termed "external rotation, or restitution." The shoulders, still in the oblique diameters, now descend until they reach the pelvic floor, when they rotate antero-posteriorly. The right, or anterior, shoulder, in the position we are considering, descends under the pubic arch and there becomes the fixed point. The left, or posterior, shoulder sweeps down the pelvic floor, and, as a rule, emerges over the margin of the floor first, when it drops down and allows the pubic shoulder to emerge. The emergence of the remainder of the fœtal body is now usually rapid, the nates being expelled after the same manner as the shoulders; that is to say, in the position we are considering, the anterior, or right, natis appearing under the symphysis and there becoming fixed, whilst the posterior, or left, natis sweeps over the pelvic floor and out at the outlet. (Plate XIV.)

R. O. A. Position (*Occiput to the Right and Anterior*).—On palpation at the superior strait the hands meet with a sense of greater resistance in front and toward the left, corresponding to the fœtal forehead. Along the right antero-lateral segment of the uterus greater resistance is determined by the palpating hands than along the left segment, corresponding to the back of the fœtus. At the right upper segment of the uterus the outline of the fœtal breech may be determined, and opposite this the small parts may usually be made out.

On auscultation the maximum intensity of the fœtal heart-sounds is determined in the line extending from the umbilicus to the right anterior superior spine, because the dorsum of the fœtus is applied to the right antero-lateral wall of the uterus. On vaginal touch, during labor, the posterior fontanelle is found forward and to the right and the anterior fontanelle behind and to the left. The sagittal suture may be traced along the right oblique diameter of the pelvis, extending from the anterior fontanelle, which is on a level with the left sacro-iliac synchondrosis, to the posterior fontanelle, which is on a level with the right ilio-pectineal eminence.

Flexion and descent are similar in mechanism to that just noted for the position L. O. A. Rotation differs only in that in order to bring the occiput under the pubes the head must turn forward along the right lateral plane of the pelvis. Extension occurs as in case of the position L. O. A. External rotation, or restitution, brings the occiput pointing toward the right thigh of the woman. The left, or anterior, shoulder becomes fixed under the pubic arch, whilst the right, or posterior, shoulder sweeps over the pelvic floor. The left, or anterior, natis passes under the pubic arch and the right, or posterior, natis sweeps over the pelvic floor.

L. O. P. Position (*Occiput to the Left and Posterior*).—On palpation the hands at the pelvic brim must sink in deeply before meeting with resistance, and this is determined to the left and behind.

Along the left lateral segment of the uterus greater resistance is determined than along the right, but the hands must palpate more deeply than in case of the position L. O. A., since the back of the fœtus is deeper and posterior instead of being applied close to the antero-lateral wall of the uterus on the left. In the right upper segment of the uterus the fœtal small parts are, as a rule, easily determined, more to the front, however, than in case of L. O. A. position. On auscultation the maximum intensity of the fœtal heart-sounds is in a line extending from the umbilicus to the left anterior superior spine, but posterior to this line instead of about its centre, as in case of the left anterior position. By vaginal touch, during labor, the posterior fontanelle is determined behind and to the left, and the anterior fontanelle is found on a level with the right ilio-pectineal eminence. The sagittal suture lies in the right oblique diameter of the pelvis, the occiput pointing toward the left sacro-iliac synchondrosis.

The mechanism of this position throughout depends on whether flexion of the chin on the sternum is complete or not. This is an extremely important point to remember, for, as will be noted later, during the progress of labor in this position everything depends on the attendant realizing the importance of maintaining this flexion by means of such measures as will be described. Where flexion is complete the head enters the pelvic superior strait and descends to the pelvic floor without special difficulty; but in case of incomplete flexion the longest diameter of the fœtal head—the occipito-frontal—cannot engage with ease at the superior pelvic strait, and there results alteration in the clinical course of labor, which will be duly dwelt upon.

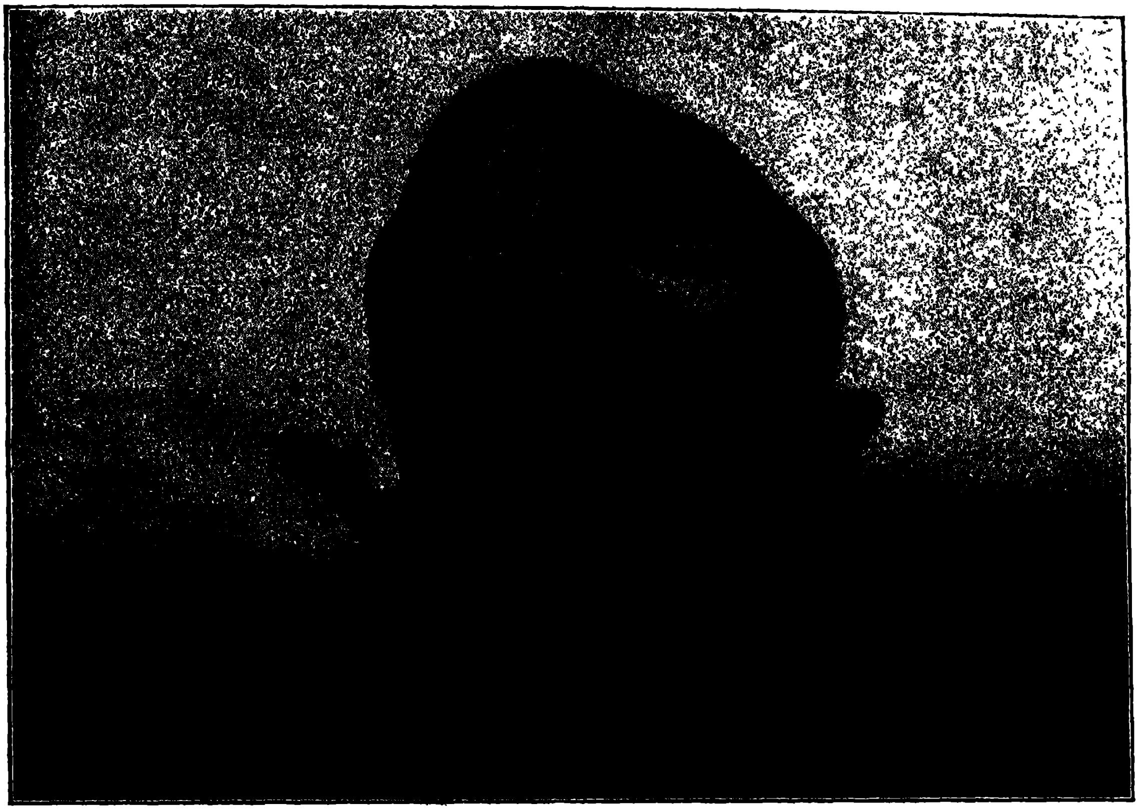
The head, being well flexed, descends to the pelvic floor in the right oblique diameter of the pelvis. On reaching the pelvic floor, under normal conditions of pelvis and of fœtal head, anterior rotation occurs. Since the occiput still points toward the left sacro-iliac synchondrosis, it is apparent that, in order to bring the occiput under the arch of the pubes, it must traverse the posterior lateral pelvic plane and then the anterior left lateral plane. In order to accomplish this, since the posterior lateral plane is deeper than the anterior, the occiput is able, as a rule, to sink deeper before beginning the rotation, flexion becoming exaggerated. The route the occiput has to travel is much longer than in case of the left anterior position, and often rotation does not occur until the pelvic outlet is reached. This is a point to be remembered, because, under normal relations as regards size, this position is apt to give rise to anxiety unless it be borne in mind that rotation is apt to occur even though delayed. The occiput once under the pubic arch, expulsion is similar to the mechanism in case of L. O. A. External restitution throws the occiput farther backward as regards the woman's thigh than in case of L. O. A., but the shoulders and the nates emerge after the same mechanism.

When the fœtal head reaches the pelvic floor in this position and flexion is incomplete, then, instead of rotation occurring anteriorly, the occiput glides into the hollow of the sacrum, giving us a position which may constitute one of the most difficult of all to deal with. This will be fully discussed in speaking of the clinical course of abnormal labor. (Plate XV.)

R. O. P. Position (*Occiput to the Right and Posterior*).—On palpation, the back of the fœtus being posterior, the hands must penetrate deeply, in order to determine the greatest resistance, which is along the right lateral segment of the uterus and posterior. The breech is found in the upper right segment of the uterus, but again at a deeper level than in case of R. O. A. The small parts of the fœtus are determined in the left upper segment of the uterus, nearer the midline than in case of R. O. A. On auscultation the maximum intensity of the heart-sounds is posterior to the line extending from the umbilicus to the right anterior superior spine. On vaginal touch, during labor, the posterior fontanelle is determined behind, to the right, near the right sacro-iliac synchondrosis, and the anterior fontanelle is found to the left and in front, on a level with the left ilio-pectineal eminence. The sagittal suture lies in the left oblique diameter of the pelvis.

The mechanism of this position, as in case of L. O. P., depends, for its normal course, as to whether flexion is complete or not, and similar remarks are applicable. Flexion being complete, when the head reaches the pelvic floor the occiput, in order to get under the pubic arch, must traverse the right postero-lateral plane, and next the right antero-lateral plane. After expulsion the occiput points a trifle posterior to the position it assumes in case of the position R. O. A.; the shoulders and the nates are delivered after a similar mechanism, the left engaging under the symphysis and the right sweeping over the pelvic floor. Where flexion is defective, either the head does not rotate until the outlet is practically attained or else the occiput turns into the sacral hollow, giving rise, as will be noted, to an exceedingly unfavorable position as regards the termination of the labor and the integrity of the structures of the pelvic floor.

PLATE XV.



Presentation of the Vertex. Left Occiput Posterior.

Presentation of the Vertex. Right Occiput Posterior.

IRREGULARITIES IN THE MECHANISM OF PRESENTATIONS OF THE VERTEX.

Under normal conditions the mechanism of labor occurs after the manner described. There are deviations from this mechanism, however, which we must consider.

At the superior strait obliquity of the uterus or disproportion between the pelvic inlet and the presenting part leads to irregularities in the presentation whereby the necessary mechanism of flexion and of descent does not occur, or occurs, at best, after an imperfect fashion. Where there exists imperfect flexion of the head, instead of the occipito-bregmatic circumference presenting, the occipito-frontal presents. Such a position is not at all uncommon before the onset of labor; but, when once this has set in, perfect engagement necessitates perfect flexion. Again, not uncommonly we note what are termed inclined presentations of the vertex, where a parietal protuberance or an ear offers at the centre of the superior strait instead of the vertex. The most common cause of this obliquity of the uterus, and the result of this presentation, is that the long occipito-mental diameter offers at the superior strait. As a rule, the position alters on rectification of the uterine obliquity, the head becomes properly flexed, and labor progresses normally. Should this not occur, obviously, the head becomes impacted at the brim and the woman cannot deliver herself.

In the cavity, as we have noted, deficiency in flexion is a common cause of posterior rotation of the occiput. The indication, therefore, is to promote flexion as soon as its absence is determined. In general, the effect of deficiency in flexion is to retard the progress of labor.

Rotation may fail altogether, particularly in multiparæ with large pelvis or disproportionately small fœtus. The occiput then escapes obliquely along the ischio-pubic rami instead of from under the pubic arch. Again, whilst the head may rotate properly, the shoulders or the trunk may not, in which case they emerge obliquely.

Rotation may become exaggerated; that is to say, the occiput may pass under the symphysis, when, instead of becoming fixed to permit of extension, it turns to the other side of the anterior lateral pelvic plane, a right position becoming a left, or *vice versâ*. Ordinarily this excessive rotation is not permanent, but the occiput shortly reverses its path and again becomes fixed under the pubic arch.

Rotation of the occiput toward the sacrum instead of under the pubic arch is the deviation from the normal mechanism which is most to be feared. In such an event, if the deviation remain permanent, it is exceptional if interference be not called for in order to effect delivery,—especially in the primipara with rigid pelvic floor. In case the head be small in proportion to the pelvic outlet, or in multiparæ with relaxed pelvic floor, the occipito-sacral position may be born spontaneously, but the process is a tedious one and always at the expense of the integrity of the muscles and fascia of the pelvic floor. The occiput must pass along the entire posterior pelvic wall, which is much longer than the anterior. The chin becomes forcibly flexed on the sternum, the forehead becomes the fixed point under the symphysis, and the occiput emerges first, followed by the face and next by the chin. Usually this mechanism occurs obliquely, but often in the midline, when the chances of laceration are greatly increased. Very rarely, as will be noted, flexion fails altogether and the face presents. In such a case, if the chin rotate backward, delivery by the natural efforts is impossible. If the chin rotate under the symphysis, then delivery occurs, as will be noted under "The Mechanism of Face Presentations."

External rotation, being in a measure dependent on the shoulders, will fail if the shoulders descend obliquely, or superrotation will occur if the shoulders rotate in a direction contrary to that which is customary. As a rule, however, where this superrotation occurs it is only apparent, being dependent on an erroneous diagnosis of the original position.

CHANGES IN THE FŒTAL HEAD UNDER THE INFLUENCE OF THE MECHANISM OF LABOR.

The fœtal head, in order to undergo the mechanism we have described, alters somewhat in shape, or molds, as it is termed. This molding is most marked where there exists disproportion between the pelvis and the fœtus, but, under normal conditions, what is termed the "*caput succedaneum*" forms, which varies in size according to the length of the labor and as to whether the membranes rupture early or late. The *caput succedaneum* is the result of a sero-sanguinolent infiltration of the soft parts of the fœtal head, and it forms on that portion which is not subjected to pressure; in other words, on that portion of the head which offers in the centre of the pelvic planes. It is of no importance and disappears at the end of a few days after labor. Its chief value is that it enables us to confirm, after the birth of the child, the diagnosis we had reached as to the position, for its situation varies according to the position of the occiput. Thus, in right positions it forms on the left lateral surface of the head, usually at the left parietal bone, whilst in left positions it will be found on the right surface of the head at the right parietal bone.

THE MECHANISM OF FACE PRESENTATIONS.

Presentations of the face occur about once in two hundred and fifty labors, and are, therefore, relatively uncommon. They result from lack of flexion, giving us the chin as the landmark instead of the occiput. According as the chin points to the left or the right antero-lateral or postero-lateral plane of the pelvis we recognize four cardinal positions (using the Latin word *mento* for chin): M. L. A. (mento-left anterior), M. R. A. (mento-right anterior), M. L. P. (mento-left posterior), and M. R. P. (mento-right posterior).

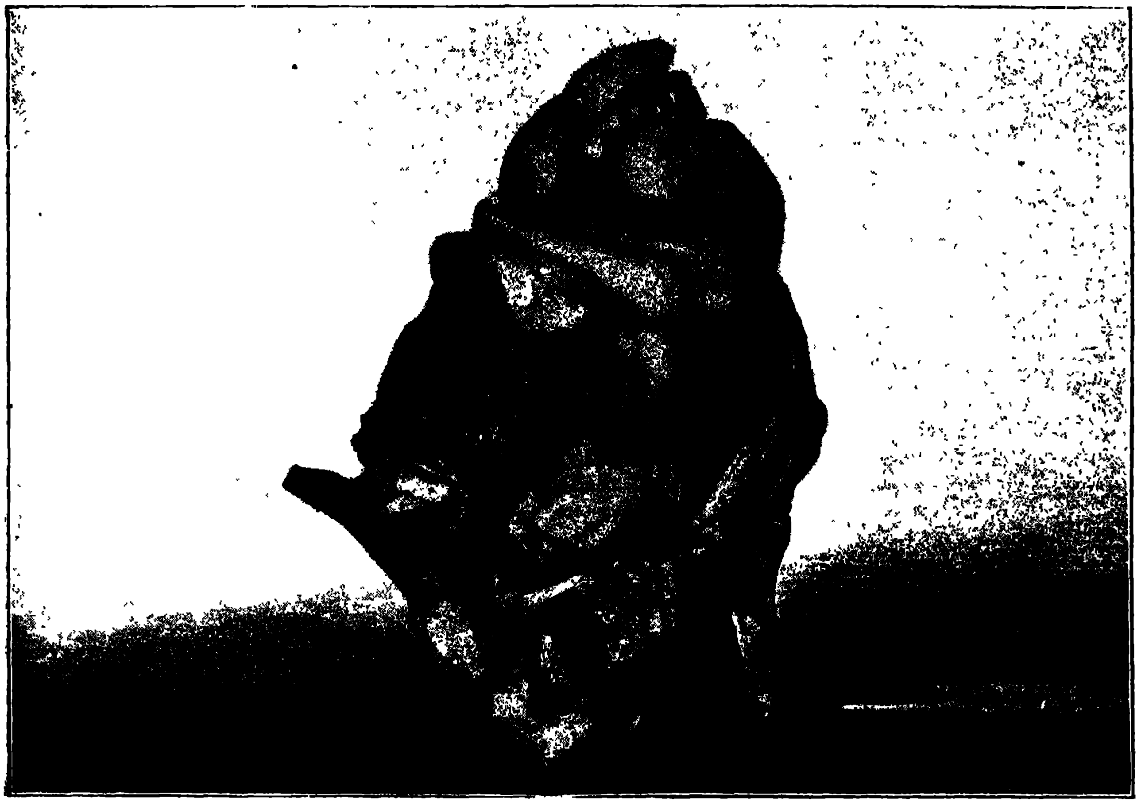
Originally all face presentations are either right or left transverse, but eventually the position assumed is one or the other above noted. Intermediate positions, chin to pubes and chin to sacrum, are described, but, under the influence of the mechanism of labor, these alter to an anterior or a posterior oblique.

The most frequent variety of presentation of the face is M. R. P.; that is to say, the forehead points to the left ilio-pectineal eminence and the chin to the right sacro-iliac synchondrosis. In fact, this position of the face is the direct extension of the most frequent presentation of the vertex,—L. O. A. Before rupture of the membranes the position is really one of the brow, but as soon as rupture occurs, the uterine forces acting through the vertebral column in a direction toward the chin, the head necessarily extends, giving us a presentation of the face. The face occupies the left oblique diameter of the superior strait, the mento-bregmatic diameter of the face lying in this diameter of the pelvis, the bimalar diameter of the face occupying the right oblique diameter of the pelvis. The ventral surface of the fœtus looks backward and to the right, the dorsal surface forward and to the left. The uterine contractions increase the extension until the occiput rests on the dorsum of the fœtus. The head thus extended descends, but never as far as in vertex presentations, since the amount to which it can descend is limited by the length of the neck of the fœtus. When farther descent is impossible the chin rotates along the right antero-lateral plane of the pelvis, the effect being that the chin is brought under the symphysis. This process is a slow one, and when the chin reaches under the arch it becomes the fixed point. The expellent forces are now applied to the forehead, and this gradually sinks lower, flexing and emerging first over the posterior commissure of the vulva. Thus, in succession, the mento-frontal, the mento-bregmatic, the mento-occipital, and finally the mento-suboccipital diameters emerge. When the face has been delivered the shoulders undergo the movement of rotation, the chin turns toward the woman's right thigh, and the remaining evolutions are exactly as in case of presentations of the vertex.

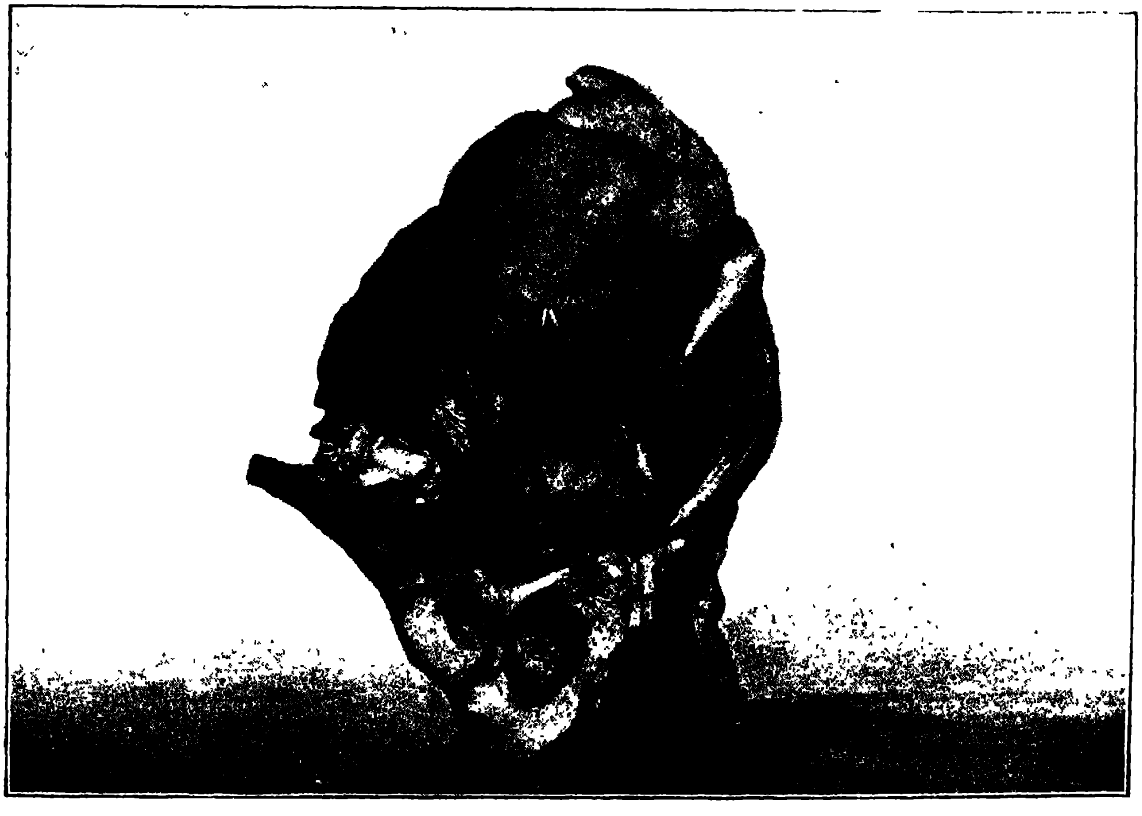
This general description of the mechanism applies to all positions, the variations simply depending on rotation from left to right or from right to left, according as one or the other is requisite to bring the chin under the pubes.

As we noted that rotation of the occiput, in case of vertex pres-

PLATE XVI.



Presentation of the Face. Right Mento-anterior



Presentation of the Face Left Mento-posterior

entations into the hollow of the sacrum, or, at any rate, posteriorly instead of anteriorly, constituted an abnormal mechanism, and one which rendered labor difficult or impossible without assistance, similarly in case of the face posterior rotation is unfavorable, and to a greater degree, since we may at once state that, when the face has descended with the chin to the sacrum, delivery constitutes a mechanical impossibility without resort to art.

The diagnosis of face presentations prior to labor must be considered impracticable so far as the differentiation of the varieties are concerned. (Plate XVI.) By palpation we may ordinarily, in case the abdominal walls are thin, make out the occiput as more prominent to the right or the left on the side corresponding to the dorsum of the fœtus, and occasionally, even, we may be able to feel the furrow formed between the back and the head by the process of extension of the head; but, beyond this, little information will be secured. On auscultation our suspicions are further aroused, since the maximum intensity of the heart-sounds, owing to the higher position of the head in face cases, will be about on the level of a line running through the umbilicus instead of in the line extending from the umbilicus to one or the other anterior superior spine, as is the case in flexed presentations of the vertex. As a rule, it is by vaginal touch that we may reach a diagnosis, and this is only possible after rupture of the membranes and with sufficient dilatation of the cervix to enable the finger to come in contact with the presenting part. On one side or the other, according to the position, we reach the sagittal suture ending at the anterior fontanelle. When the finger follows this suture as far as possible it reaches the superciliary ridges and the root of the nose. Below this we find the nostrils and the mouth. We may not be able to reach the chin, but a little care in recognizing the landmarks we have just noted will save from error in diagnosis. The direction of the nostrils will teach where the chin lies, and sometimes we may be able to reach one or the other ear, when, bearing in mind the shape of this organ, the diagnosis is again further certified to.

The above landmarks are easy of recognition early in labor, but, in cases where the labor has been prolonged before a proper examination has been made, the formation of the caput on the face practically obliterates them, rendering the diagnosis exceedingly difficult unless we are able to reach the chin. In case of prolonged labor (and face cases are usually very tedious) the caput distorts the face to a great degree. The cheeks and the lips are greatly swelled and the lids of the eyes are enormously œdematous; often the head of the fœtus remains extended for days after delivery.

PRESENTATIONS OF THE PELVIC EXTREMITY.

The pelvic extremity of the fœtus may offer at the superior pelvic strait either after a complete or an incomplete fashion. A complete presentation is where the breech of the fœtus and the lower extremities offer; that is to say, where the thighs are flexed on the pelvis, the legs on the thighs, and the heels are applied to the nates. (Plate XVII.)

There are varieties of incomplete presentation; thus, the legs may be extended on the ventral surface of the fœtus, or the feet may offer, or the knees, or either one foot or one knee.

Whatever the variety of presentation, the mechanism of labor is the same.

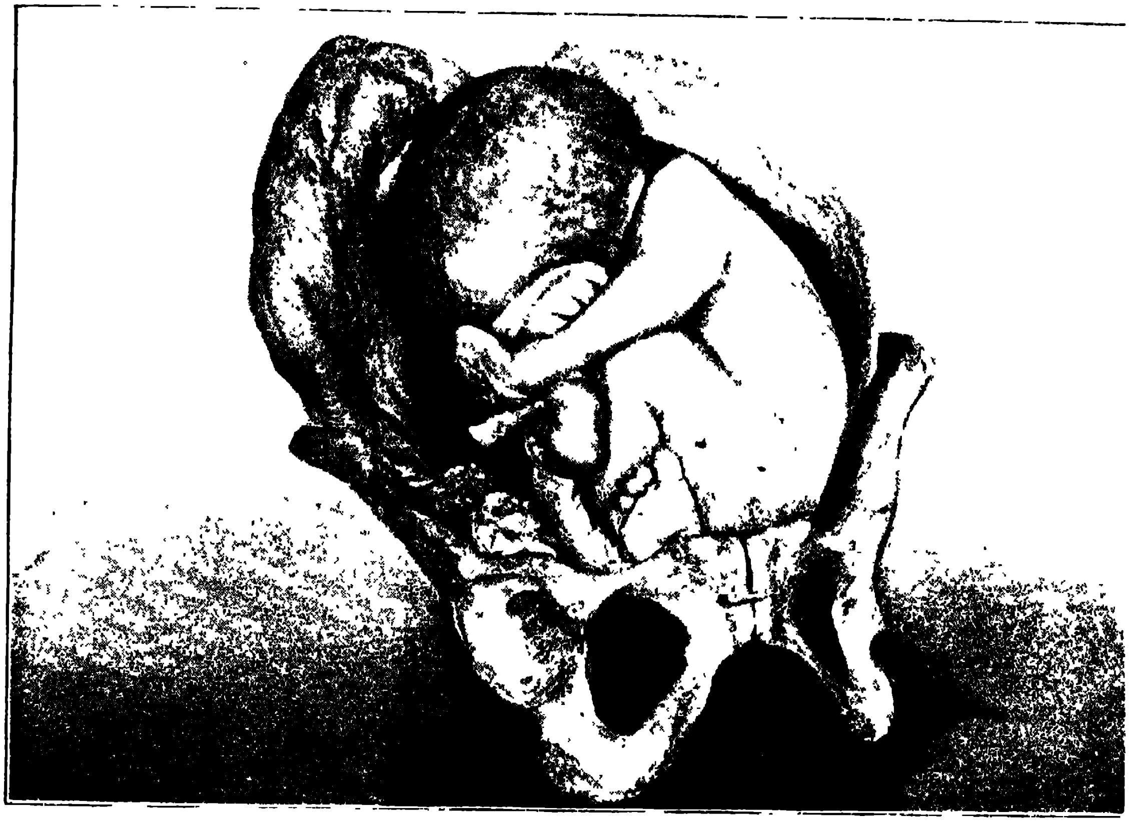
Presentations of the pelvic extremity are next in frequency to those of the vertex, occurring about once in fifty cases. The positions are denominated according to whether the sacrum of the fœtus points toward the left or the right anterior or posterior lateral plane of the pelvis.

Thus we determine: S. L. A. (sacro-left anterior), S. R. A. (sacro-right anterior), S. L. P. (sacro-left posterior), and S. R. P. (sacro-right posterior).

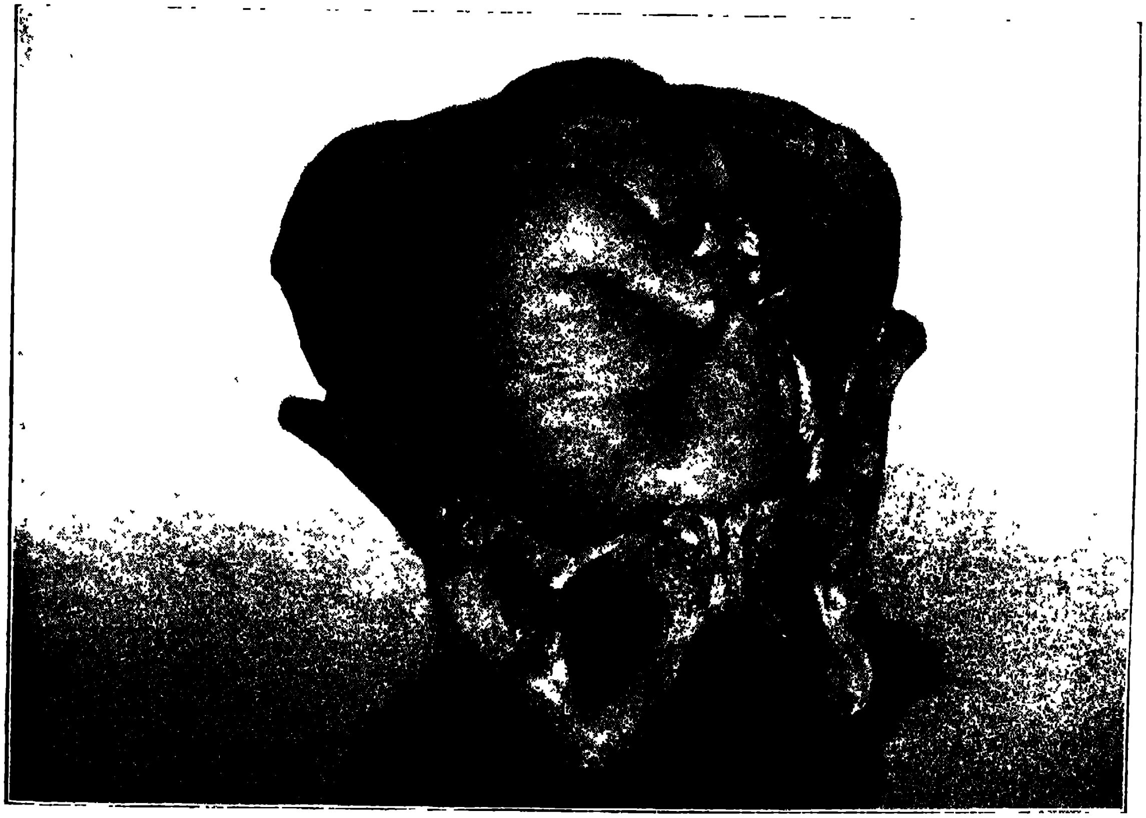
The left positions are more frequent than the right, even as held in cases of presentations of the vertex.

From a study *in extenso* of the left anterior sacral position the mechanism of the other positions can be readily understood.

PLATE XVII.



Presentation of the Breech. Left Sacro-anterior Position



Presentation of the Breech Right Sacro-posterior Position

MECHANISM OF SACRO-LEFT ANTERIOR POSITION.

On palpation the pelvic extremity is determined in the left iliac fossa. The outline of the dorsum of the fœtus may be traced along the anterior left lateral wall of the uterus. In the right upper uterine segment the hard, roundish head may be felt, and where the liquor amnii is present in sufficient amount ballottement of the head may be elicited. On auscultation the maximum intensity of the heart-sounds is determined above the level of the umbilicus and to the left. Prior to rupture of the membranes vaginal touch reveals simply the absence of an accessible presenting part, the lower uterine segment being filled to a greater extent than is the case where the cephalic pole of the fœtus presents. After rupture of the membranes, the cervix being patulous to the examining finger, we reach the anterior, or left, natis; below this the cleft between the nates is determined. When the finger is passed upward to the left the anus is detected, and beyond this the coccyx. The determination of the coccyx not alone certifies to the presentation, but also to the position, since it always points toward the ventral surface of the fœtus. In case of the position we are considering, the coccyx points posteriorly and to the right. In case the sacrum can be felt it will be found to point forward and to the left. The fossa between the nates occupies nearly the left oblique diameter of the pelvis, the bi-iliac diameter being in the right oblique of the pelvis.

In case of presentation of the pelvic extremity, when the membranes rupture, since the breech does not fit the superior strait as accurately as the vertex, the liquor amnii drains away rapidly and the uterine walls close down on the fœtus. The result is that complete flexion of the fœtal parts occurs, the fœtus thus being made as small as possible to adapt itself to the superior strait. The first mechanism, therefore, is termed "adaptation." Next occurs descent. The sacrum sinks down the left anterior plane in an oblique manner to the floor of the pelvis. Here it meets with resistance. In accordance with the same law of physics which held in case of the other presentations we have considered,—that is to say, when a body is subject to the action of two opposing forces it moves in the direction intermediate between the two, viz., in the direction of least resistance,—the sacrum rotates until the anterior, or left, hip passes under the pubic arch and the posterior, or right, hip glides backward into the sacral concavity. This rotation is necessarily a slow procedure, especially in case of primiparæ, because the soft, yielding breech of the fœtus offers but slight resistance, comparatively, to the opposing forces. The anterior hip having passed under the pubic arch, this hip becomes the fixed point, and around this the posterior hip gradually revolves along the pelvic floor till it emerges at the posterior vulvar commissure. It then drops down toward the woman's anus and the anterior hip emerges from under the symphysis. Whilst the hips have rotated antero-posteriorly, the shoulders and the head have remained transverse. The shoulders now rotate obliquely and thus descend to the pelvic floor, where they meet with resistance and rotate in turn antero-posteriorly, the left shoulder becoming fixed under the pubic arch and the right gliding into the concavity of the sacrum. The left shoulder becoming the fixed point, the right traverses the pelvic floor and is delivered over the posterior vulvar commissure. The left then passes from under the symphysis. The head of the fœtus next rotates into the oblique diameter and descends to the pelvic floor, when it in turn rotates antero-posteriorly, the occiput becoming fixed under the pubic arch, and delivery occurs even as in original presentations of the vertex,—left anterior variety.

MECHANISM OF SACRO-RIGHT ANTERIOR POSITION.

On palpation the pelvic extremity is found chiefly in the right iliac fossa. The back of the fœtus lies forward and in the right anterior lateral segment of the uterus. The head occupies the left upper uterine segment, and where the liquor amnii is not deficient it may be ballotted there. The maximum intensity of the fœtal heart-sounds is above the umbilicus and to the right. On vaginal touch, after rupture of the membranes, the intergluteal fossa may be traced in the right oblique diameter of the pelvis, the coccyx pointing to the left and backward. The bi-iliac diameter of the fœtus occupies the left oblique diameter of the pelvis.

The mechanism of labor is the same as in case of position S. L. A., except that rotation occurs in the direction from left to right for the hips and from right to left for the occiput.

MECHANISM OF SACRO-RIGHT POSTERIOR POSITION.

On palpation it is necessary to press in deeply in order to meet with the sense of greater resistance, for the reason that the dorsal plane of the fœtus lies posterior. By turning the woman on her left side the right lateral posterior plane of the uterus is brought more to the front and the back of the fœtus may be indistinctly mapped out, the head occupying the left upper uterine segment, although determinable with greater difficulty, since the occiput is more to the rear. On auscultation the maximum intensity of the heart-sounds is to the right of the umbilicus and above, although more posterior than in case of S. R. A. On vaginal examination, after rupture of the membranes, the intergluteal fossa is found in the left oblique diameter of the pelvis, the coccyx pointing forward and to the left and the sacrum being posterior and to the right. The bi-iliac diameter of the fœtus lies in the right oblique diameter of the pelvis. The mechanism of labor is identical with that described for anterior positions, except that the anterior hip has to traverse a portion of the posterior right lateral plane and the anterior right lateral plane in order to engage under the pubic arch. This rotation occurs from right to left. Rotation is, of course, more prolonged than in case of anterior positions.

MECHANISM OF SACRO-LEFT POSTERIOR POSITION.

The dorsal plane of the fœtus is directed to the left posterior wall of the uterus; the intergluteal fossa is in the right oblique diameter of the pelvis, and the bi-iliac in the left oblique. The coccyx points forward and to the right, the left hip being forward and to the left. Again, the steps in mechanism are the same as for anterior positions except that rotation is more prolonged since the anterior left hip has to travel a greater distance in order to impinge under the symphysis.

IRREGULARITIES IN THE MECHANISM OF PRESENTATIONS OF THE PELVIC EXTREMITY.

Even as in the case of presentations of the vertex and of the face, the pelvic extremity may present obliquely at the superior strait, and this gives rise to abnormality in the mechanism of engagement. The phenomena of flexion and of descent will occur more readily, furthermore, the more complete the presentation, since the fœtus will thus best adapt itself to the plane of the pelvic inlet. Where the fœtus lies obliquely the uterine contractions never act as favorably as when the fœtus approaches the plane of the superior strait perpendicularly. Again, the less complete the presentation, the less readily does the pelvic extremity act properly in causing dilatation.

Rotation may be incomplete or may fail altogether. The fact, however, that the pelvic extremity is very compressible renders oblique delivery possible, and such an occurrence is by no means rare.

A frequent irregularity in delivery which greatly complicates is extension of the arms above the head. This complication may be traced to irregularity in the contractions of the uterus, whereby the arms are not kept closely applied to the body of the fœtus; but often the arms extend because, after delivery of the trunk, the attendant makes injudicious traction on the breech, especially in the absence of uterine contractions.

After delivery of the trunk the life of the fœtus is necessarily greatly imperiled, since the umbilical cord is likely to become compressed. It is requisite, therefore, that the fœtal head should rotate after a normal manner. The irregularities in mechanism here are dependent on the manner after which rotation of the head occurs.

PLATE XVIII.

Presentation of the Trunk. Dorso-anterior Position.

Presentation of the Trunk. Dorso-posterior Position

There are two important deviations from the regular mechanism: either the head does not rotate at all or else it rotates posteriorly. Again, the head may rotate, but, instead of remaining flexed, it extends. In the latter event the chin is arrested behind, above, or below the sacro-vertebral angle. Each one of these irregularities in mechanism requires interference on the part of the attendant, as will be noted when the subject of "The Management of Abnormal Labor" is considered.

During the descent of the pelvic extremity that portion which is subjected to the least pressure swells according to the duration of the labor after rupture of the membranes. As a rule, the caput forms on the anterior buttock, but not exceptionally the swelling extends to the genitals, the scrotum being greatly enlarged.

PRESENTATIONS OF THE TRUNK.

Presentations of the trunk are denominated according as the right or the left shoulder presents, with the fœtus offering its dorsal or its ventral surface anterior or posterior. The head of the fœtus is, therefore, either to the left or to the right. The simplest classification, therefore, is that which takes account both of which shoulder presents and in what direction the head of the fœtus lies. Thus, we recognize the following positions :—

Head to the right with the right shoulder presenting, in which case the ventral surface of the fœtus is in front.

Head to the left with the left shoulder presenting, in which case the ventral surface of the fœtus is in front.

Head to the right with the left shoulder presenting, in which case the dorsal surface of the fœtus is in front.

Head to the left with the right shoulder presenting, in which case the dorsal surface of the fœtus is in front.

The diagnosis of position, in case of presentation of the trunk, depends, therefore, obviously, on the determination of which shoulder offers and on whether the head lies to the right or to the left. (Plate XVIII.) Only very exceptionally are these positions exact ones. As a rule, either the elbow offers instead of the shoulder or else the hand or the hand and the arm prolapse, in which event the diagnosis is greatly simplified, since the recognition of that hand which is prolapsed at once tells us the necessary position. These points will be appropriately dwelt upon in the chapter which treats of "The Management of Labor." At the present we will simply study the mechanism of delivery in this untoward presentation.

At the outset the statement holds that almost invariably presentation of the trunk calls for intervention, and, therefore, the mechanism is that which is imparted by the attendant. The classical steps which apply to other presentations are followed here, however, according to the method selected for intervention.

Nature's mechanism of dealing with presentations of the trunk is twofold: Either *spontaneous version* occurs or else *spontaneous evolution*.

By spontaneous version we mean that, under the influence of the expulsory forces, the trunk is converted into either a presentation of the cephalic or of the pelvic pole of the fœtus. Before the onset of labor spontaneous version occurs with great frequency. Indeed, before engagement of the fœtal presenting part, unless the liquor amnii is markedly deficient, there is nothing to prevent the fœtus from executing any motion. After engagement, however, or after the rupture of the membranes, spontaneous version is of very rare occurrence, although it may and does occur.

The mechanism of spontaneous version is the following: Where spontaneous version occurs, if the case has been carefully examined beforehand, it will be noted that one or another pole of the fœtus lies lower, although it is still the shoulder which offers. The force of the uterine contractions is thus not directed against or in favor of the engagement of the presenting part, but it acts unevenly, and the fœtal pole which lies lowest is forced down. The shoulder thus necessarily recedes and the head or the breech takes its place. Obviously, such mechanism is hardly likely to occur after engagement, and the attendant should, in any event, never expect it; but there are many cases recorded where, even after engagement and descent, version has occurred, although always in cases where the fœtus has been very small or the pelvis very large.

Spontaneous version having occurred, delivery takes place in accordance with the mechanism peculiar to either vertex or pelvic presentation, according as the conversion has been into one or the other type.

By spontaneous evolution is understood the delivery of the trunk, although the shoulder remains the presenting part. These instances are exceedingly rare, but they are authentic. The mechanism is as follows:—

The membranes having ruptured and the presenting shoulder having engaged, the uterus applies itself closely to the fœtus, compressing the component parts together. The result is that the cephalic pole tends to approach as closely as it can the pelvic pole. The shoulder, impelled by the expellent forces, descends as far as it can, and the extent of descent that is possible depends on the length of the fœtal neck. After a variable interval, usually a protracted one, rotation occurs. The shoulder is thus brought under the symphysis. Coincident with rotation of the shoulder the head moves above the symphysis, and it there becomes fixed. The anterior shoulder and the head of the fœtus are situated in front, and the posterior shoulder, with the rest of the fœtus, lies behind. As the uterine contractions continue to act, the posterior shoulder is forced downward along the posterior portion of the pelvis and emerges over the posterior vulvar commissure, followed in turn by the thorax, the hips, and the pelvic extremity. The anterior shoulder, during these evolutions, has remained fixed under the symphysis and is now expelled, the head remaining behind to be born according to the mechanism of delivery of the after-coming head.

Caput Succedaneum.—The *caput succedaneum* forms on that portion of the fœtus which is subjected to the least pressure, and therefore is found on the anterior shoulder, as a rule. This shoulder and the corresponding arm and hand are greatly enlarged and ecchymosed, as would be expected when we remember that the described mechanism is exceedingly tedious.

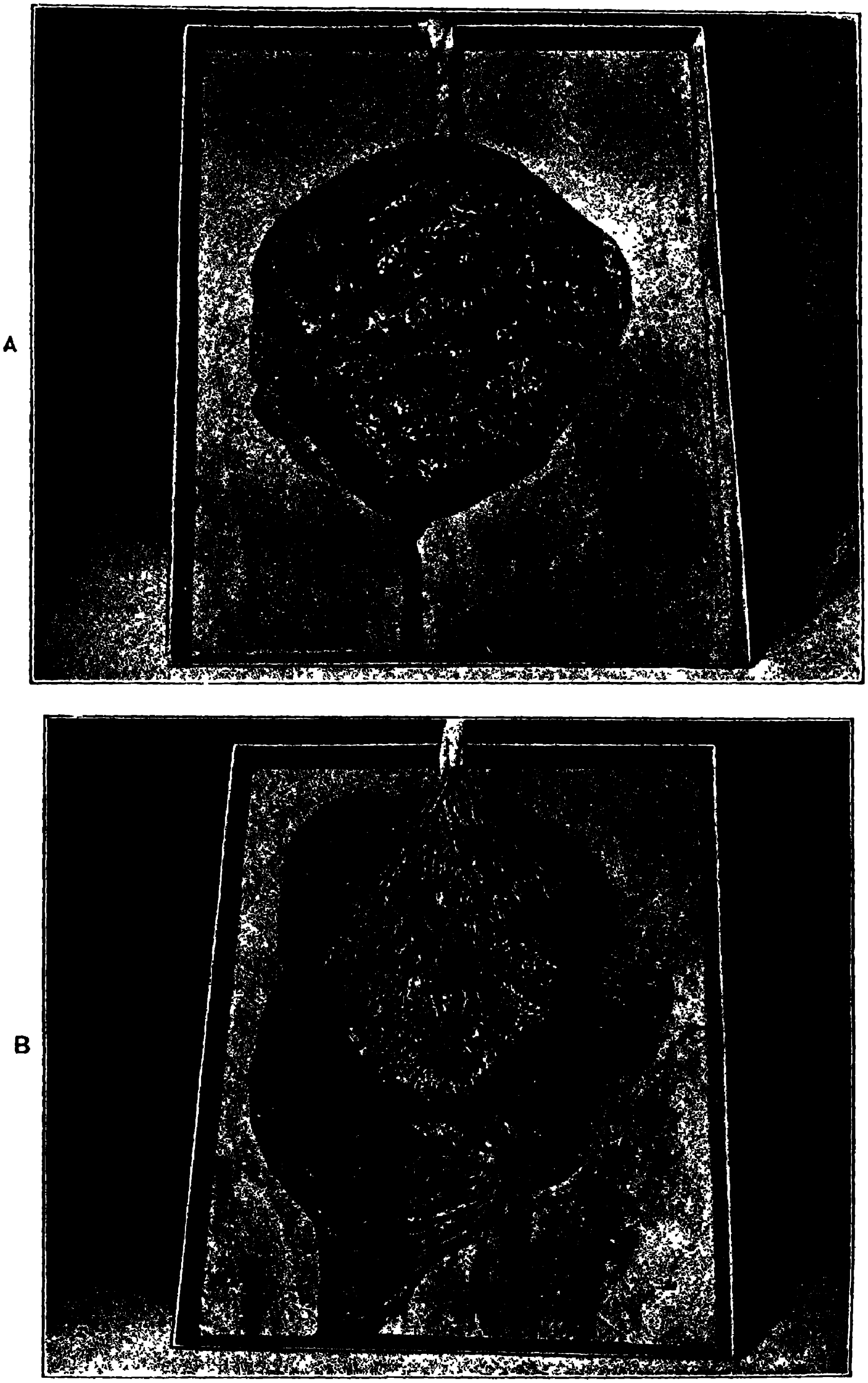
THE MECHANISM OF PLACENTAL DELIVERY.

Since labor does not terminate with the expulsion of the fœtus, but remains incomplete until the placenta has been delivered, it remains for us to consider the mechanism of placental expulsion, a proper understanding of which is requisite in order to enable the attendant to determine, in actual practice, the boundary-line between the normal and the abnormal in this stage of labor.

The fœtus having been expelled from the uterus, there remains behind the placenta with the membranes. The placenta, at term, consists of a spongy tissue, rich in blood-vessels, measuring, on an average, about seven and one-half inches in diameter, irregularly round in shape. One surface is covered by the amnion and is smooth; the other surface is applied to the uterus and is rough. (Plate XIX.) This uterine surface is grooved and is divided into spaces, each of which forms a placental tuft, or cotyledon. At its edges the placenta thins out and merges into the membranes. The rough uterine surface of the placenta is covered by that part of the decidual membrane which separates from the uterus when the placenta is expelled. It will be remembered that the uterus, at the site of implantation of the placenta, is thickened through the formation of the serotina, and the mechanism of placental expulsion is completed through the separation of a portion of this,—a splitting, as it were; so that, after placental delivery, part of the serotina remains on the uterus and the balance covers the maternal part of the placenta.

The placenta in position follows the curvature of the uterine walls, the amniotic or fœtal surface being concave and the maternal surface being convex. After the uterus has expelled the fœtus there occurs a pause, a period of rest, as will be dwelt upon later on. During this pause what is termed the retroplacental hæmatoma is formed, varying in size and consisting simply of an effusion of blood under the placenta. When, after a variable interval, the uterus again contracts, the major part of its contents having been expelled, the uterine walls can retract to a greater degree, and the result is not

PLATE XIX.



The Placenta.

A. The Maternal Surface. B. The Fœtal Surface and the Membranes

alone that the placenta is pressed upon firmly, but also that the walls of the uterus retract greatly at the site of placental attachment. The result of these three causes—formation of retroplacental clot, compression of the placenta, and retraction of the uterine walls—is that the decidual surface is split and the placenta becomes separated from the uterus. This may be taken as the usual method of placental separation. Occasionally no retroplacental clot forms, or, at any rate, it is so slight as not to be effective in the mechanism; or else a large retroplacental clot forms at the centre of placental attachment, the result being that this central portion bulges downward, the periphery remaining attached. Then the separation of the placenta occurs more gradually, one area after another becoming detached.

Separation of the placenta having taken place, the next step is expulsion. Either immediately after separation or after an interval the uterine contractions drive the placenta from the uterus into the vagina or out of the vulva. There are two ways after which the placenta is expelled from the uterus: it passes out edgewise or else its surface is inverted, the fœtal portion appearing first. The consensus of opinion favors the view that the edgewise expulsion is the most frequent, the placenta sliding down along the uterine wall and presenting its edge at the cervix and thus entering the vagina. It is highly probable that expulsion of the placenta through inversion—that is to say, the fœtal surface appearing first—is due, as a rule, to injudicious interference with the normal mechanism, such as by traction on the cord to expedite delivery.

CHAPTER VI.

THE CLINICAL COURSE OF LABOR.

THE clinical phenomena of labor are conveniently studied under the following headings: "The Precursory Phenomena, or the Stage of Onset"; "The Phenomena of Dilatation, or the so-called First Stage"; "The Phenomena of Expulsion, or the so-called Second Stage"; "The Phenomena of Retraction, or the so-called Third Stage."

PRECURSORY STAGE OF LABOR.

The active phenomena of labor rarely set in suddenly. As a rule, there are certain precursory signs which point to impending labor. The first is the subsidence of the uterus,—the so-called *lightening.* This is due to the sinking of the uterus toward the pelvic brim, which is associated with a greater or less degree of engagement of the fœtal presenting part. The abdomen becomes less prominent at the ensiform cartilage, the woman suffering less in consequence from interference with respiration, and the abdomen bulging more between the umbilicus and the pubes. A result of this sinking of the uterus is that the pressure symptoms on the bladder and on the rectum are intensified, micturition being more frequent and occasionally an artificial diarrhœa being provoked. Œdema of the lower extremities and of the genitals is increased, and often there is an hypersecretion from the vagina, the result of increased venous congestion.

These precursory signs set in usually about two weeks before the appearance of active labor, and they furnish a fairly reliable guide for the prediction of the time of labor. For a few days preceding the appearance of active contractions the woman complains of abdominal pain, which is associated with a hardening of the uterine tumor. We have noted that, throughout pregnancy, the uterus normally contracts and relaxes, giving us the intermittent uterine contractions which, we have seen, are valuable as assisting us in reaching a diagnosis of pregnancy. These precursory pains are simply the intensification of the normal uterine contractions, but, since they have very little actual effect in causing dilatation, they are known as " false " pains.

On vaginal examination at this period we note marked changes in the cervix. It gradually ceases to exist as such, becoming merged in the lower uterine segment. This change in the cervix was formerly considered as only an apparent one, due to the so-called normal softening; but to-day we know that the change is the direct consequence of the merging of the cervix into the lower uterine segment. So long as the vaginal portion of the cervix remains it may be definitely concluded that normal labor is not impending. Just so soon as the effacement of the vaginal portion of the cervix occurs, this may be taken as a sign that labor is imminent. These cervical changes differ according as the woman is a primipara or a multipara. In the primipara the fœtal part becomes engaged early and the cervical changes are rapid; so that, just before active labor sets in, the internal os and the external os have practically merged, the cervix being represented simply by a dimple in the vaginal vault.

In case of the multipara, engagement of the fœtal presenting part is less pronounced and effacement of the cervix is less marked. The cervical canal, however, is apt to be open, the finger readily reaching the internal os and the membranes. Even here, however, so long as there remains space between the external and the internal os it may be safely predicted that normal labor is not impending.

These changes which we have noted set in about the thirty-eighth week of pregnancy; that is to say, in the neighborhood of two weeks before term. About the fortieth week true labor sets in and we pass to the consideration of dilatation.

STAGE OF DILATATION.

This stage is known as the first stage of labor. During this stage the cervix opens widely, so as to allow the presenting part to enter the vagina. We have seen that, for a number of days prior to the onset of labor, the woman suffers from pains to which the term "false" has been applied, for the reason that they are not effective, to an appreciable degree, in causing dilatation of the cervix. These false pains are short and nagging, being located chiefly in the lower part of the abdomen. True labor-pains, on the other hand, differ in site and in character. These pains are simply the intensification of the intermittent contractions of the uterus which prevail throughout pregnancy. They are still intermittent, but they possess a true rhythm. They start from the back and extend around the abdomen. At first of short duration, as uterine action becomes intensified they last for fully one minute. The contractions are purely involuntary. During their continuance the woman suffers greatly, the face becoming flushed and the pulse accelerated. Following the subsidence of the contraction there occurs a pause of variable interval, this being succeeded by renewed contraction. The intermittent nature of these uterine contractions subserves the double purpose of enabling the woman to recover strength to bear another, and also to enable the uterine circulation to become re-established, which, in turn, enables the blood of the fœtus to become oxygenated. Further still, the intermittence of the contractions results in gradual yielding of the muscular fibres of the cervix, whereas continuous contraction would result in spasm and defeat the object aimed at, which is the opening of the cervix.

As the uterus contracts it changes in shape and in its axis. The organ hardens and, in the interval, again becomes soft. Its shape becomes cylindrical, the transverse diameter becoming shortened and the antero-posterior diameter lengthened. The position of the uterus changes, the fundus approaching the anterior abdominal wall, its longitudinal axis, therefore, tending to become more coincident with that of the axis of the superior strait.

The effect of these contractions is twofold: The cervix is caused to open and the membranes are driven down toward and into the opening cervix, which fact also, as we shall note, assists in dilatation.

The manner after which the cervix is caused to open is the following: The body of the uterus is composed mainly of longitudinal muscular fibres, and, beneath these, of a layer of transverse fibres. When these fibres are in action the effect is that the organ becomes shortened antero-posteriorly and transversely. The cervix, on the other hand, is composed of circular fibres, which are attached to the longitudinal fibres of the body of the organ. It is at once apparent that the necessary effect of the contraction of the muscular fibres of the body of the organ is the exercise of traction on the cervical fibres. As the uterine contractions increase in force, the fibres of the body of the organ being stronger than the circular fibres of the cervix, the latter must needs yield or relax, and thus the cervix opens.

A further effect of the uterine contractions is to drive its contents downward toward the cervix. Under normal conditions, since the expelling force acts in the direction of the axis of the inlet of the pelvis, the contents of the uterus exert direct pressure on the cervix. The fœtus floats in its membranes, and when the uterus contracts the water in these membranes is driven down, forming an hydrostatic wedge of great dilating power. It is likely, further, that the pressure of this wedge on the cervix acts as a direct irritant, which, of course, leads to an intensification of the uterine contraction. After the membranes rupture, if this should occur prior to complete dilatation of the cervix, the fœtus itself, descending against the cervix, acts as the wedge. Premature rupture of the membranes, however, is undesirable, as will be noted, because the fœtal presenting part can never as effectually assist in dilatation, since it cannot project into the cervix as can the bag of waters.

This process of dilatation of the cervix is slow and progressive under normal conditions. As a rule, ten to fifteen hours are requisite in the primipara and six to eight in the woman who has borne children. During dilatation the shape of the cervix varies according as the woman is a primipara or not. In the primipara the opening of the cervix retains its circular shape, its edges becoming thinner and the presenting part, owing to its deeper engagement from the start, being more accessible to the examining finger. In the multipara the shape assumed will depend on the lesions which the cervix has suffered at previous deliveries and the amount of the cicatricial tissue which has in consequence formed.

As the cervix dilates certain of its muscular fibres tear superficially, giving rise to a bloody oozing known as the "show," because its appearance is distinct evidence that dilatation is progressing.

Whilst, as a rule, under normal conditions, when once uterine contractions set in they are apt to continue after a rhythmical fashion, not infrequently these contractions will cease for hours or, instead of retaining the normal rhythm, they will become short in duration and nagging, being absolutely lacking in dilating force. If the membranes have not ruptured, the cessation of the contractions need cause no anxiety, because the fœtus cannot possibly suffer so long as it remains uncompressed in its natural uterine habitat, but the occurrence of the nagging contractions of short duration tires out the woman and usually means that the uterine force is not acting in the proper axis or at a disadvantage, owing, possibly, to faulty position or to disproportion between the pelvis and the fœtus.

As the cervix approaches complete dilatation its circular fibres are drawn upward until they tend to retract over the fœtal presenting part. The membranes then rupture with a gush; the uterine walls become closely applied to the fœtus; flexion of the fœtus is intensified, and the presenting part passes through the open cervix into the upper part of the vagina. There is, however, no established rule as regards the time when rupture of the membranes occurs. At times rupture sets in even before labor, although then, often, it will be found that there existed a double amniotic sac, the second remaining intact. Again, the membranes may not rupture until the fœtus is on the point of being born, or even until after birth, the child coming into the world surrounded by its "caul." Frequently, where the membranes are thin or careless vaginal examination is made during a uterine contraction, they rupture before the cervix has dilated to an appreciable degree. This occurrence, as will be noted, is unfavorable, since the process of dilatation is thus impeded and much prolonged.

As the membranes bulge through the cervix they assume various shapes, according to the amount of water they contain and the nature of the presenting part. They are tense and resisting during a contraction and soft and flaccid during the interval. The degree of bulging depends not alone on the amount of liquor amnii present, but also on the presenting fœtal part. Thus, in case of a normal presentation of the vertex, the membranes will never bulge to the same degree as in case of presentation of the pelvic extremity, for the reason that the vertex can apply itself more closely to the lower uterine segment than can the breech, and therefore less water can emerge in front of the vertex. This is a wise provision, as will be noted, since, in case of presentation of the pelvic extremity, dilatation must necessarily be accomplished by the membranes, the breech, from its shape, not forming a dilating wedge, as may the vertex.

Dilatation of the cervix having been completed and the membranes having ruptured, the presenting part engages and escapes from the cervix, and we pass to the

STAGE OF EXPULSION.

During this stage the contractions of the uterus are re-enforced by the action of the abdominal muscles. The same rhythmical character is present,—first the *contraction*, then the *relaxation*, then the *pause*. During the period of contraction the fœtal presenting part descends in the vagina, and during the pause it recedes a trifle, thus avoiding the consequences of continuous pressure on the soft parts of the pelvis. The duration of this, the second stage of labor, is exceedingly variable. In the multipara with relaxed pelvic floor, as soon as the cervix has dilated, the presenting part may descend, rotate, and be delivered by a very few pains and in only a few minutes. In the primipara, however, the condition of the soft parts is different. Whilst during the latter part of pregnancy the vagina has undergone changes which prepare it for the process of dilatation, to which it must become subjected, the muscles and the fascia of the pelvic floor require time to stretch; so that ordinarily the second stage in the primipara lasts two or three hours. The greatest resistance is offered at the outlet, and it is through the intermittence of the pressure that the vulvar cleft is caused to yield without resulting lesion. During this expulsory stage of labor the actions and the appearance of the woman alter. She assists herself during the contractions; that is to say, through forcible bearing-down effort she is able to drive the presenting part downward. As the presenting part reaches the outlet the urethra is pushed upward, the perineum bulges outward, the anus dilates, and the suffering of the woman becomes of the most acute type. It is here, as will be noted, that anæsthesia should be resorted to, not only to spare the woman suffering, but also to protect the integrity of the maternal soft parts, which are greatly endangered if the bearing-down efforts are not partially suspended. The contractions continuing, the fœtus is shortly expelled and then follows the

STAGE OF UTERINE RETRACTION, OR OF PLACENTAL EXPULSION.

The birth of the child is followed by a gush of bloody fluid consisting of the residual liquor amnii and of blood. A pause in the phenomena then ensues. This pause is conservative, in that the woman is granted a few minutes' rest from her labors, and the uterus is enabled to regain tone for the final act of delivery. This period of rest varies in duration from a few minutes to fifteen or twenty. During the interval the umbilical cord is tied off and the child is separated from its mother. In rare instances the cessation of contraction is continuous, because in the final act of delivery of the child the placenta has also been expelled from the uterus into the vagina, rarer still into the world. As we have noted, the detachment of the placenta takes place through retraction of the uterus, consequent compression of the placenta, and separation of a layer of the decidua at the site of insertion. This detachment does not take place after a uniform manner. At times the centre becomes detached, a retroplacental hæmatoma of considerable size forming, or else the primary detachment is marginal. Whatever the case, uterine retraction is followed by uterine contraction, and the placenta, as a rule, slides down the uterine wall, the fœtal surface rolled together, and thus it passes into the vagina and through the vulvar cleft. The expulsion of the placenta after this normal fashion is practically painless, and is followed by the passage of clots and a variable quantity of blood. For a time thereafter there is a tendency to uterine relaxation, especially in instances where the act of labor has been protracted and the uterus has in consequence lost tone, but, eventually, firm uterine contraction sets in, which is so desirable as a safeguard against hæmorrhage. After expulsion of the placenta the maternal and the fœtal surface should be carefully examined to determine if all has been shed, since, as will be noted, complete expulsion is essential to a smooth puerperal state.

The completion of the stage of placental expulsion marks the beginning of the puerperium.

ANOMALIES IN THE CLINICAL PHENOMENA.

The physiological course of normal labor is as we have stated it. Anomalies in the phenomena vary in degree, and when they are intensified the course of the labor becomes abnormal.

The contractions of the uterus may, from one or another cause, be inefficient as regards provoking dilatation of the cervix. The woman may be of the highly nervous, hyperæsthetic type, in whom reflex nerve irritability is, at best, abnormal, and then the contractions lack the requisite rhythm or are short in duration, and in so far ineffective. So long as the membranes remain unruptured the consequent prolongation of the labor has no effect on the fœtus, but the woman becomes exhausted and, if means are not taken to secure regular and effective contractions, the fœtus suffers indirectly, since it necessarily sympathizes with the maternal organism. Another consequence of ineffective, irregular contraction is the provoking of spasm of the uterus, in which event, the uterine circulation being impeded, the fœtus necessarily suffers. After the rupture of the membranes tetanic spasm of the uterus, if not relieved, will kill the fœtus. The contractions of the uterus, on the other hand, may be excessive; that is to say, but little pause occurs between the contractions. The effect of this, aside from tiring out the woman, may be the occurrence of precipitate labor, with the consequent risks to the woman and the child. The fœtus, placenta, and the membranes being suddenly expelled, hæmorrhage from the organ may be profuse enough to exsanguinate the woman before the uterus has a chance to regain tone and contract efficiently. Should the woman be in the erect position when this precipitate delivery occurs the fœtus might strike the floor with sufficient force to kill it, and inversion of the uterus may occur. After the rupture of the membranes the uterine contractions may affect chiefly the lower uterine segment; that is to say, the portion just above the internal os where the body of the uterus is differentiated from the cervix. In such an event this area may be thrown into a spasm and a contraction ring may form, which impedes further descent of the fœtus unless the attendant interferes. Irregular spasm and contraction of this nature may, further, lead to rupture of the uterus.

After the rupture of the membranes the abdominal walls may not respond and do their share toward effecting the expulsion of the fœtus. These walls may be weakened from one or another cause, such as hernia or laxity from excessive distension long continued, and then the *vis a tergo* will not suffice to overcome the resistance of the pelvic floor.

Obliquity of the uterus, whereby the uterine force is unable to act in the centre of the pelvic planes, pendulous abdomen, disproportion between the pelvis and the fœtus, abnormal presentation, intercurrent disease,—Bright's or cardiac lesion,—such are further causes of inefficiency in the uterine contractions, the result of which is delayed labor, possibly calling for active interference.

Even though the uterine contractions follow the normal course, dilatability of the cervix may be excessively slow or impossible unless the attendant interferes. Premature rupture of the membranes, especially in case of an abnormal presentation, and even in case of the normal presentation of the pelvic extremity, uniformly retards labor, for the reason that the dilating hydrostatic wedge is absent. Rigidity of the muscles of the cervix, the result of cicatrices from previous labors, or of actual disease of the cervix, such as beginning cancer, or the result of the application of caustics, —all these factors act as impediments to normal dilatation. Whilst the uterine and abdominal contractions are strong and regular, in certain of these instances the attendant must interfere in order to avoid maternal exhaustion with the concomitant fœtal risk.

After rupture of the membranes and complete dilatation, notwithstanding strong and regular expulsory efforts, descent of the fœtal part may be impeded. Very frequently this will be found to be the case with primiparæ who have passed the age of 25, the cause of arrest being an unyielding coccyx or an actual ankylosis at an acute angle. Instances of this nature will usually call for the interference on the part of the attendant not alone in order to release the impacted presenting part, but also in order to avoid protracted pressure on the maternal soft parts. During the second, or the expulsory, stage of labor we have noted that the normal clinical course is for the presenting part to descend during a contraction and to recede during the interval. This is a wise provision, since the result is that continuous pressure is not exerted on the muscles of the pelvic floor. Just as soon as this recession of the presenting part fails to occur the time has arrived for interference, else sloughing and, perhaps, fistula into the bladder or into the rectum may occur.

When, under the influence of the expulsory contractions, the presenting part reaches the pelvic floor, excessive rigidity may lead to protraction of the stage of final expulsion. The vulvar cleft may be actually too small to allow of the expulsion of the presenting the woman becomes exhausted and, if means are not taken to secure regular and effective contractions, the fœtus suffers indirectly, since it necessarily sympathizes with the maternal organism. Another consequence of ineffective, irregular contraction is the provoking of spasm of the uterus, in which event, the uterine circulation being impeded, the fœtus necessarily suffers. After the rupture of the membranes tetanic spasm of the uterus, if not relieved, will kill the fœtus. The contractions of the uterus, on the other hand, may be excessive; that is to say, but little pause occurs between the contractions. The effect of this, aside from tiring out the woman, may be the occurrence of precipitate labor, with the consequent risks to the woman and the child. The fœtus, placenta, and the membranes being suddenly expelled, hæmorrhage from the organ may be profuse enough to exsanguinate the woman before the uterus has a chance to regain tone and contract efficiently. Should the woman be in the erect position when this precipitate delivery occurs the fœtus might strike the floor with sufficient force to kill it, and inversion of the uterus may occur. After the rupture of the membranes the uterine contractions may affect chiefly the lower uterine segment; that is to say, the portion just above the internal os where the body of the uterus is differentiated from the cervix. In such an event this area may be thrown into a spasm and a contraction ring may form, which impedes further descent of the fœtus unless the attendant interferes. Irregular spasm and contraction of this nature may, further, lead to rupture of the uterus.

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When, under the influence of the expulsory contractions, the presenting part reaches the pelvic floor, excessive rigidity may lead to protraction of the stage of final expulsion. The vulvar cleft may be actually too small to allow of the expulsion of the presenting part, even though there be no impediment from the side of the pelvis; or else the muscles and the fascia may be excessively rigid, in which case, in order to avoid deep laceration, it may be necessary for the attendant to interfere by the performance of episiotomy. (*Vide* "Obstetric Surgery.")

During the first and the second stages of labor hæmorrhage may occur from premature separation of the placenta in part or in whole. Such hæmorrhage constitutes one of the most alarming of obstetrical complications. It stands to reason that the life of the fœtus is directly placed in jeopardy and, as we shall see, the woman may become exsanguinated before the attendant can render her any service. Hæmorrhage of this character is called *concealed* hæmorrhage, for the reason that the blood may be effused above the uterine contents, but little appearing externally, often not enough to attract the attention of the attendant. The general clinical phenomena, however, alter. The pulse becomes rapid; the woman complains of feeling faint; the uterine tumor distends abnormally; the contractions alter in character, becoming weak and ineffective or ceasing altogether, as a result of the weakened condition of the woman and, further, as a result of the distension of the uterus. All this time, as we have stated, there may be no appreciable flow of blood externally, and yet the woman is surely drifting into a condition of acute anæmia. The watchful observer will note the alteration in the clinical phenomena. On auscultation he will determine that the fœtal heart is becoming rapid and faint, and the change in the maternal pulse will awaken his suspicions. Perhaps, on pushing up the presenting part, a gush of blood will ensue or clots will pass; but usually the diagnosis of concealed hæmorrhage must be based on the alteration in the clinical phenomena, and the course of action should be simply according to the surgical rule of getting at the source of the hæmorrhage and checking it. The chances are that when the diagnosis is strongly suggestive the child has already succumbed. Whatever is done is in the interests of the woman alone. Since the hæmorrhage is going on in the uterus, dissecting off the placenta and distending the uterus, the sole way to check it is to empty the organ in the quickest possible manner consistent with its integrity, and then resorting to compression of the bleeding-point, so to speak, according to the method which will be described under the subject of "The Treatment of Post-partum Hæmorrhage." It should be remembered that, prior to rupture of the membranes, the amount of blood which may be effused is simply limited by the distensibility of the uterus. As an actual fact, the woman, in certain reported cases, has practically bled to death before the complication has been recognized. The emptying of the uterus has been followed by the placenta and quarts of blood and of clots.

After the completion of the second stage of labor certain anomalies of the third stage may demand interference. As a rule, very little hæmorrhage accompanies the expulsion of the placenta. Exceptionally the uterus has lost tone, in which event it does not contract, and the attendant may have to face one of the most alarming complications of delivery. If the uterus does not contract the uterine sinuses do not close, and in this event the amount of blood which the woman may lose in a relatively short time may be sufficient to exsanguinate her. The methods for meeting this emergency will be treated of in the proper place, the aim being the promotion of uterine retractility and contractility, or else the compression of the bleeding-point, so to speak, in accordance with the surgical rule applicable to hæmorrhage.

The third stage may further be anomalous in that, notwithstanding efficient retractility of the uterus, the placenta does not separate, owing to the fact that pre-existing disease of the endometrium or disease of the decidua has led to the formation of adhesions at the placental site. These instances are exceptional, since disease of either type is apt to cause the woman to shed the fœtus before term. Apparent adherence of the placenta is not uncommon. In such an event either the placenta has been shed and is lodged in the upper vagina or else the internal os or the lower uterine segment has closed down and the placenta has not passed through, although lying free in the cavity of the uterus. The formation of a contraction ring above the level of what would constitute the internal os were the parts not dilated is a common cause of retention of the placenta.

Ordinarily the course of labor is not associated with lesion of the soft parts. Lacerations of the cervix and of the pelvic floor, however, are of not infrequent occurrence, and this, too, without the attendant being necessarily to blame. The course of labor should never be deemed completed until these lesions are looked for by digital touch of the cervix and direct inspection of the pelvic floor, since the attendant will be blamed, and rightly so, who, when repair is feasible, does not resort to it in accordance with the methods exemplified in the portion of this work dealing with the surgery of the puerperal state. (*Vide* "Obstetric Surgery.")

state are not always attainable, but the nearer these are approximated, the better the ultimate result.

Our prelude to the study of normal labor—and this also applies to the deviations from the normal—must consider the condition of the lying-in room and the necessary precedent care of the woman about to be confined. Labor being essentially a physiological process, complications which ensue should only be those which cannot be forestalled.

THE LYING-IN ROOM.

Cleanliness, fresh air, and sunlight are characteristics which the lying-in room should possess as far as possible. Whilst it is doubtful if puerperal infection can be traced to impure surroundings,—that is to say, can occur through atmospheric influence,—it nevertheless holds that in the performance of a physiological process such as labor, even as during the passage through a disease, the human body can best withstand agencies which may work harm if the conditions which hold sway over health are present. The best room in the dwelling should be selected for the lying-in room, and where possible this room should have no direct contact with the water-closet. It should contain as few articles of furniture as possible, heavy rugs and hangings being removed. The room should be thoroughly cleansed, the walls wiped down and the bare floor scrubbed. Even though the carpets and hangings may do no harm, they are at least liable to damage, and the air is purer and sweeter for their absence. In case at any previous time an acute infectious disease has run its course in the room, greater precautions are necessary. It is accepted to-day that the lying-in woman is exceedingly susceptible to the absorption of contagion, and, therefore, a room which has been occupied by a person sick of scarlet fever, measles, or the like, should be prepared even as would the ward of a well-appointed hospital. The walls should be wiped down with a solution of bichloride of mercury 1 to 1000, the floor should be scrubbed with the same solution, and then, notwithstanding the skepticism prevalent, the room should be fumigated carefully by the burning

PLATE XX.

The Lying-in Bed (showing the Permanent Rubber Sheet and Sheet, and over thes the Rubber Sheet and Draw-sheet).

of sulphur or by formaldehyde-vapor. This procedure may eventually be proved futile or unnecessary; but, just so long as many believe the process necessary in order to guard against contagion, it can do no harm to resort to it.

The simpler the appointments of the lying-in bed, the better. (Plate XX.) The mattress should be covered with a large piece of rubber sheeting; over this the sheet is spread; a second piece of rubber sheeting covers this; and over this is placed the draw-sheet,—that is to say, a sheet folded a number of times on itself, on which the woman is confined. After the completion of the act of delivery the nurse or attendant simply pulls this folded sheet and the uppermost piece of rubber sheeting from beneath the woman, and at once, without specifically adding to her exhaustion, she lies in a clean bed.

We have already laid stress on the necessity, whenever possible, of the woman being watched with care during the process of gestation. If the urine has been examined at stated intervals, if the pelvis has been measured in order to determine the possibility of delivery at term, if the hygiene of the skin and of the intestinal canal has been attended to, the woman reaches term in a good condition to undergo, without undue strain, the physiological phenomena of labor. Immediately preceding the onset of labor the intestinal canal should be thoroughly cleansed by laxative and enema, because the normal mechanism of labor proceeds to best advantage when the rectal *cul-de-sac* is not loaded with fæces; and, again, because, during the expulsory stage, the crowding out of fæcal matter is annoying to the attendant as well as interferes with the requisite cleanliness. As soon as true labor-pains set in the external genitals should be washed with bichloride-of-mercury solution (1 to 5000) or with creolin solution (1 per cent.), and a vulvar pad should be applied. A similar pad should be worn during the progress of labor, being changed as often as it becomes saturated. Ordinary absorbent cotton, sewed in cheese-cloth bags, will answer admirably for pads at this time and during the puerperal state. The cheese-cloth should be boiled to remove the sizing, and after the pads are made they should be baked in an oven before use. The physician should not countenance the wearing of the old-fashioned napkin. Nowadays a material should be used which may be burnt after use, and the pads described are so inexpensive that their cost is hardly to be counted when compared with the additional cleanliness secured through their use. In the households of the very poor, where, of necessity, cloths of whatever nature attainable must be used, the attendant should be directed to boil them carefully before use. These precautions are absolutely necessary, in order to avoid infection, which, according to modern views, comes from contact.

The attendants should be scrupulously clean. Asepsis and cleanliness are synonymous terms. Both may be secured without resort to antiseptics, but, in order to leave no loop-hole for infection, which can but alter a normal, physiological act into a pathological, the latter must be used. Especially is this requisite if the physician has been or is in attendance on an infectious disease. The exigencies of a large general practice will not allow the physician to refuse to attend to cases of labor, but, in view of the truth of the assertion that the lying-in woman becomes septic, with rare exceptions, owing to the carelessness of some one of her immediate attendants, extra precautions are not alone requisite, but become the bounden duty of every conscientious man. These precautions take but little time, and the man who is not willing to give this time in order to safeguard a human life had better decline obstetrical work altogether. Complete change of clothing, washing of the hair and the beard, washing of the hands, and a full bath, before going from an infectious case to the lying-in woman, are the requisites. It matters not so much the kind of antiseptic used. The aim to be attained is cleanliness.

The careless nurse is even more dangerous than the careless physician. From force of training he will always aim at a degree of cleanliness, while she, in her supreme ignorance, which in her opinion is often of greater worth than the knowledge of the physician, may go so far as to disobey his instructions. Fortunately, the puerpera who has been confined after an antiseptic manner, and who has been left clean, requires but little attention, the lack of precaution in regard to which might lead to infection. This is one of the advantages gained by the giving up of the systematic douching which characterized the puerperium of the past. These points will be dwelt upon in the chapter dealing with the puerperal state.

Every preparation should be made to meet the possible emergencies of labor. The well-appointed lying-in room should contain a bed-pan and douche-pan, a fountain-syringe, absorbent cotton, at least five yards of gauze, fluid extract of ergot or the preparation known as ergotole, anæsthetics (chloroform and ether), a glass, and a soft-rubber catheter. Of course, the amount of material present will depend, of necessity, on the means of the individual case. For the poorer class of patients the physician will probably have to furnish the cotton and the gauze, and possibly the ergot and anæsthetic, and often he will be obliged to dispense with the bed-pan and douche-pan. We are noting here the articles which ought to be obtained or furnished in order that the physician may be fully prepared to meet every possible complication. These articles must be carefully sterilized by heat and thereafter kept sterile. When summoned to a case, however normal it promises to be, the physician should at least carry his forceps with him, since he may frequently feel called upon to use this instrument to avoid maternal exhaustion or death of the fœtus. It goes without saying that the forceps will be rendered aseptic before use.

Whilst we have noted that it is desirable to have anæsthetics at hand, it by no means follows that they need always be used. Much depends on the exigencies of the individual case. It is definitely settled now that anæsthesia during labor, administered as it will ordinarily be,—short of the surgical extent,—carries no risk to either the woman or to the child. On the contrary, we are enabled not only to spare the woman needless suffering, but also often to forestall impending maternal exhaustion and at the proper time to protect the integrity of the maternal soft parts. The questions to consider are the kind of anæsthetic which it is preferable to use and the time when we ought to resort to it. The belief, long prevalent, that anæsthesia tended to favor the occurrence of post-partum hæmorrhage, may to-day be disposed of by the statement that, unless it be given for a prolonged interval to the surgical degree, it does not interfere with the firm retractility and contractility of the uterus, which are desirable after the stage of placental delivery.

As a rule, chloroform is the best obstetrical anæsthetic except, possibly, where the administration is to be prolonged. In such a case ether should be selected, for the reason that accidents following its administration have been less frequent than after chloroform. These accidents, in all fairness it should be stated, are very exceptional during labor. The tendency to heart-failure and to respiratory failure is lessened during the parturient act, owing to the fact that the uterine contractions are constantly driving the blood to the brain through the heart, and, again, the efforts of the parturient necessarily entail free oxygenation of the blood. Such statements hold true, at any rate, for ordinary obstetrical anæsthesia, which is never pushed to the surgical degree. The woman always remains conscious of her surroundings; we are able, at a moment's notice, to relieve her of the influence of the anæsthetic; consciousness is never completely abolished, as is the case in surgical anæsthesia. And yet we accomplish a number of desiderata: We take the edge off the suffering, so to speak; we abolish, in a measure, reflex excitability,—which often nullifies the bearing-down efforts; we assist in the relaxation of the muscles of the pelvic floor and, even without resorting to surgical anæsthesia, we may relieve spasm of the uterine muscle; we are enabled often to save the integrity of the pelvic floor, which otherwise would inevitably have to yield to the applied pressure of the presenting part.

Anæsthesia given to the non-surgical degree does not abolish uterine or abdominal contractions, but, on the contrary, ether, in particular, at times, would seem to re-enforce them. At the moment when the presenting part is clearing the perineum, when the suffering is of the acutest type, the anæsthetic may be pushed to the surgical degree.

In case of operative interference we prefer ether. Under such conditions it is requisite to obtain anæsthesia of the surgical type, and it is unquestionable that then the safest anæsthetic is ether.

The more profound the anæsthesia, the greater the abolition of the contractions of the uterus and of the abdominal muscles and the longer it requires for the uterus to regain tone on emergence from the anæsthetic. Therefore, after the administration of an anæsthetic to the surgical degree, the greater the danger of post-partum hæmorrhage. It is wise, therefore, for the physician to have everything in readiness for the control of the hæmorrhage, should this occur.

As a rule, obstetric anæsthesia is called for only when the presenting part reaches the pelvic outlet. Then is the time when abolition of the contractions is desirable, for the double purpose of saving the woman the intense agony of the final expulsory act and the integrity of the muscles and the fascia which form the diaphragm of the outlet.

The rules for administering an anæsthetic to the surgical degree are identical with those which hold for anæsthesia in general. The presence of another physician is requisite in order that the respiration and the pulse may be noted *lege artis.* Ordinary obstetrical anæsthesia, being intermittent and never prolonged to the surgical degree, may be safely administered by the attendant himself or by the nurse. In emergencies, the woman herself may be allowed to anæsthetize, and a convenient method is the following: An ordinary goblet is packed with a handkerchief, the edges of the goblet are greased with oil or with vaselin to prevent the chloroform from trickling down and burning the face of the woman. The goblet is handed to the woman and she is instructed to hold it over her mouth and her nose during the acme of the contraction. This takes the edge off her pain, and, in case she takes enough of the anæsthetic to abolish reflex action, the goblet at once drops from her hand and any risk of over-anæsthesia is avoided. It is dangerous to hand the woman a handkerchief on which the chloroform has been poured, for, in the event of the anæsthesia suddenly becoming deep, the handkerchief will drop on her face, and, if the attention of the physician is required for the conduct of the delivery, the woman may take too much of the anæsthetic. As a general rule it may be stated that, whenever possible, a physician should be present to give the anæsthetic.

The minor anæsthetics, or, rather, analgesics, of utility during labor are chloral and opium or its alkaloids.

Chloral has a place of great value in obstetrics. Whilst it is not an analgesic in the true sense, it certainly gives decided relief. During the first stage of labor, when the pains are nagging and in so far ineffective, the administration of chloral in 15-grain doses, repeated half-hourly for three doses, regulates the contractions of the uterus and thus gives the woman a period of rest during the pains. The interval between the contractions is lengthened and the pains are intensified, the uterus regaining tone during the longer intermissions. It has been claimed that this drug has a direct effect in causing a rigid cervix to soften and, in so far, to dilate with greater readiness. This is questionable, but it is certainly true that rigidity of the cervix will often yield under the effect of the drug, although the true explanation probably is that, owing to the regulation of the contractions, the intensity is greater, and therefore the dilating effect is increased.

Chloral is also of value for the control of the false pains which typify the precursory stage of labor, and acts admirably in allaying the suffering caused by the after-pains of the puerperal period. Opium and its salts should rarely be used in labor or the puerperal state. The aim is to secure physiological action of the intestinal canal after labor and during the puerperal period, and if opium is administered there is likelihood of intestinal peristalsis being checked. The chief value of opium is to allay reflex nervous excitability, and if other means fail, and the woman is becoming exhausted from the ineffective character of the contractions, this drug holds out a means of relief by giving the woman a period of sleep, during which the irritability of the uterus may be checked, with the result that the contractions become rhythmical and natural. Codein is the form in which opium had better be used. It has not the same inhibitory effect on the peristalsis of the intestine that opium and morphia have, and yet, if administered in sufficient dosage it is as speedy in effect. The dose of codein is larger than is generally recognized. Thus, it is safe to administer 1 $^1/_2$ grains by mouth and 3 grains by rectum.

In obstetrics, as elsewhere, opium is the best remedy of all for the relief of deep shock. After the completion of tedious labor where the pulse is rapid and the woman is in shock—to a degree—reaction may best be secured through the administration of an hypodermic injection of morphia. Barring this exception, it is wise to remember that that puerperal state will be the smoother in which the administration of opium has been avoided, and that certain possible complications of this state are most amenable to treatment where the woman has not been saturated with opium for the relief of symptoms which will ordinarily yield to chloral.

The first duty of the physician when called to a case of labor is to satisfy himself that the presentation is a normal one. If he has been engaged beforehand he has familiarized himself with the configuration of the pelvis according to the rules laid down under the subject of "Pelvimetry," and therefore knows that, so far as the pelvis is concerned, there is no obstacle to the progress of labor after the normal mechanism; or, in case he has determined pelvic contraction or abnormity, he is in a position to take advantage of those measures which the character of the deviation from the normal demands. If he has not been engaged beforehand, his duty is to study the pelvis and to make up his mind if it is of sufficient capacity to enable the woman to deliver herself unaided. On the acquiring of this knowledge will depend the regulation of his own movements as well as the safety of the woman and the child. In the case of a primipara, where the pelvis and the presentation are normal, it is not desirable that the physician should remain in immediate attendance, but, having assured himself and his patient that all is right, he may safely attend to his other duties in the knowledge that a certain length of time must elapse before his immediate services will be required. He may, therefore, leave his patient with the nurse, and thus avoid causing unnecessary anxiety in the mind of the patient.

as well as be spared the constant questioning to which he will be subjected if he remain in the house. The lying-in room should be left to the patient and her nurse. The presence of anxious relatives has a demoralizing effect on the woman, and also uses up the oxygen in the room which she needs in order to go through her ordeal in the best possible condition. A few quiet reassuring words from the physician, especially if his manner be calm and his appearance free from anxiety, will do much to give the patient confidence in her ability to pass through her ordeal in safety.

The physician, having scrupulously disinfected his hands, proceeds to determine the presentation. The woman lies on her back, the abdomen being covered by a thin sheet, and palpation determines the attitude of the fœtus. Above the brim in multiparæ, and a trifle below it in primiparæ, the palpating hand will detect the head or the breech unless the shape of the uterus—transverse—certifies that the presentation is transverse; in which case no presenting part will be determined at the superior strait. The hands next palpate the lateral walls of the uterus to determine on which side there is the greatest resistance, due to the dorsum of the fœtus. Next, the listening ear makes out the point of maximum intensity of the heart-sounds, as also their rhythm. The presentation having been determined, the next step is to make the vaginal examination, which enables the physician to satisfy himself in regard to the progress of dilatation and the position of the presenting part.

The hands having been again carefully rendered aseptic, and the external genitals of the woman having been similarly disinfected, the physician separates the vulvar cleft with the thumb and the index of one hand and introduces the index or the index and the middle fingers of the other hand into the vagina, depressing the perineum as much as is possible in order to be able to reach the cervix, which, during the first stage of labor, owing to the approach of the body of the uterus to the anterior abdominal wall, is apt to be in the sacral excavation. This method of inserting the finger is preferable to that generally followed, where the finger finds its way into the vagina by being swept from the anus into the posterior vulvar commissure, since it is, above all things, necessary to carry no infectious material into the vagina, as is likely if the woman has involuntarily defecated between the cleansing of the genitals and the insertion of the finger. The examining finger takes note of the degree of engagement of the presenting part and of the condition of the cervix. If active labor-pains have been present the cervix will be found somewhat dilated, and if the finger be left in the vagina during a contraction the membranes will be found to bulge during a pain. During a contraction care must be taken not to rupture the membranes, since on their integrity during the first stage of labor rapidity of dilatation depends, particularly in case of presentation of the pelvic extremity.

If the membranes be thin and dilatation has progressed sufficiently to enable the finger to reach the presenting part, then, in the interval of a contraction, an attempt may be made to determine the landmarks of the presenting part which lead to the differentiation of the position, such as the fontanelle and the direction of the sagittal suture in case of presentation of the cephalic pole, the coccyx and the intergluteal cleft in case of the pelvic extremity, etc. As a rule, however, until dilatation has progressed one-half,—that is to say, until the cervix has dilated sufficiently to permit of exploration without much risk of rupture of the membranes,—if the pelvis is normal, and if the presentation is of the type which ordinarily causes no anxiety—vertex or breech—the physician at this stage may rest satisfied with the information secured. He may then inform the woman and relatives that everything is progressing satisfactorily and that he will return in a variable interval of time, according to the determined degree of dilatation. When asked, as he will be, how long labor will last, he must never commit himself to a definite time, since, in the most normal case, the contractions may suffer arrest and the labor be protracted. The best answer to give is that everything depends on the frequency of the contractions and that it is simply impossible to state a time. Before leaving he should inform the nurse of his movements, so that he may be notified in case a complication arises.

During the stage of dilatation the position of the woman may vary according to her inclination. It is better that she should not assume the recumbent position, since the contractions of the uterus act to better advantage if she be erect or sitting; and then, again, she bears the pains to better advantage. She may eat and drink what she pleases, chloral being ordered, in case of nagging pains or nervous excitability, in the dose of 15 grains every hour or half-hour for three or four doses.

It will be remembered that during the first stage of labor the contractions are purely involuntary, the abdominal muscles being ineffective prior to rupture of the membranes and full engagement of the presenting part. The woman should, therefore, be directed not to waste her strength in futile bearing-down efforts. In the event of the contractions being regular, rhythmical, and yet the cervix remains rigid, a valuable means of assisting dilatation is the hot douche. This should be administered under perfect aseptic precautions. Sterilized water at a temperature of 110° F. may be used, to which creolin may be added to make a 1-per-cent. solution. Bichloride of mercury had better be avoided, since a large quantity of water will be necessary and the risk of poisoning should be borne in mind. At least four quarts of water should be used and the douche should be repeated at half-hourly intervals. This hot douching, aside from favoring dilatation by directly assisting in the softening of the rigid cervical muscles, also intensifies the uterine contractions.

Where, notwithstanding these measures, the pains remain ineffective and become nagging in character, the physician, having satisfied himself that the pelvis is normal, should think of the possibility of the position being an unfavorable one. It will be remembered that obliquity of the uterus will interfere with proper dilatation, since the contractions cannot act in the axis of the plane of the superior strait. Such obliquity may be corrected by the application of a bandage, underneath which is placed a pad at the side toward which the uterus inclines: or the woman may be directed to lie down on the side opposed to the inclination of the uterus.

Should this anomaly be rectified and still dilatation does not progress, or the contractions assume the nagging type, the time has arrived for determining the exact cause, for it is, above all, necessary that the woman does not become exhausted in fruitless efforts. A very common cause of faulty dilatation and of nagging, ineffectual pains is the lack of engagement of the head, owing, possibly, to a tendency to extension at the brim or to a posterior position of the occiput.

Exact diagnosis is now requisite, and if on digital examination the physician is unable to make out the position, the insertion of the entire hand into the vagina is necessary, under anæsthesia. This procedure enables the diagnosis to be certified, and at one and the same time the measures for remedying the faulty position may be resorted to. These deviations from the normal course of labor will be considered in the section devoted to the consideration of the course and the management of abnormal labor.

The physician repeats his visits, and, each time under careful asepsis, makes his examination, until the stage of dilatation is completed or the membranes have ruptured. Just so long as there is no evidence of maternal or of fœtal exhaustion, and just so long as the clinical course of labor is proceeding after the normal fashion, the physician's policy is a waiting one, and his immediate attendance is not requisite; on the contrary, his presence in the lying-in room simply excites the anxiety of the woman. As a rule, the diagnosis of position and of the capacity of the pelvis having been determined as normal, the fewer the examinations, the better. No matter how careful we are in our asepsis, each examination carries the risk of infection.

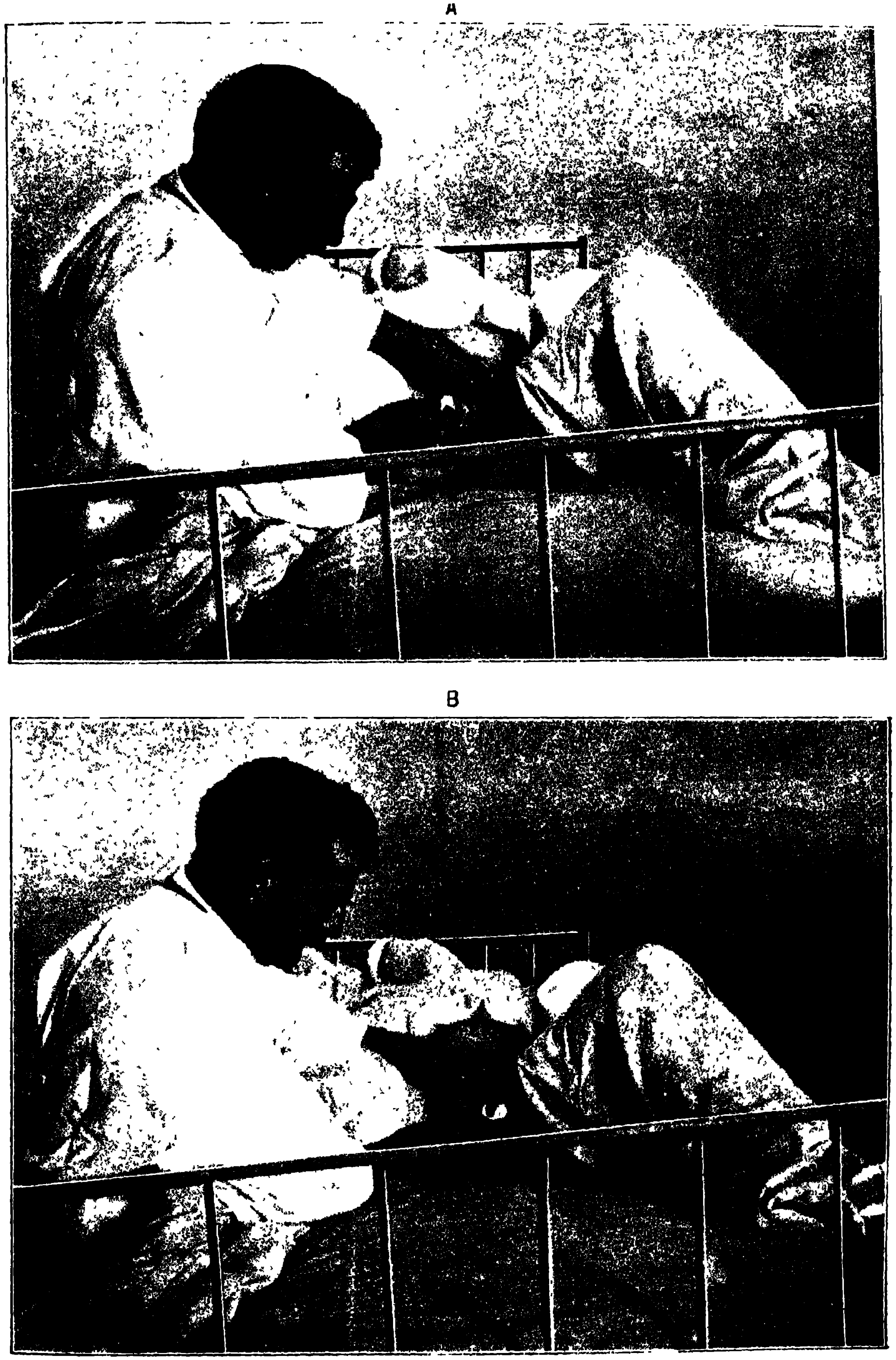
When dilatation has become complete or when the membranes have ruptured, the physician should remain in the house, especially if the woman be a multipara. The second stage of labor not infrequently is very rapid, and the services of the physician may be needed at any time. Interference will rarely be called for, unless the woman or the fœtus gives evidence of exhaustion, just so long as the presenting part is undergoing the normal mechanism of descent and engagement. The position of the woman during the second stage of labor, especially when the presenting part has reached the pelvic floor, should be recumbent on the side or on the back, according to the preference of the accoucheur. The dorsal position, in the vast proportion of cases, is the preferable one for delivery, —the woman lying across the bed, her nates at the edge. The abdominal muscles now coming into play, the woman may assist herself by bearing down, and such effort is more effective if she can make traction on the hands of the nurse or on a fixed object, such as a sheet tied to the bed, and if also she can press her heels against the edge of the bed or against two chairs. In case of great rigidity of the pelvic floor and a tendency of the presenting part not to recede during the interval in the contractions, it is advisable to place the woman in the lateral position, when the presenting part is less likely to exert undue pressure on the pelvic floor.

During this second stage of labor the bladder should be emptied at intervals, whenever possible through the voluntary efforts of the woman, or, if she cannot, she should be catheterized, always by sight after precedent cleansing of the introitus of the vagina. (Plate XXI.) A distended bladder will interfere with descent of the presenting part, aside from the risk of rupture of the bladder under the forcible expulsory efforts.

A frequent cause of delay in this stage, when otherwise everything is normal, is non-retraction of the anterior lip of the cervix. This lip becomes excessively œdematous and bulges down in front of the presenting part, thus interfering with descent. The remedy is to push this lip over the presenting part in the interval of a contraction and to maintain it there during a contraction.

At times, after rupture of the membranes, the tone of the uterus apparently gives out and the inertia is complete. Obviously the child is apt to suffer if such inertia be allowed to continue, and the effect on the woman of such delay in the progress of the labor is bad. There are a number of things which may be resorted to for recalling the contractions. Massage of the uterus will at times prove successful. The administration of quinine in large doses,

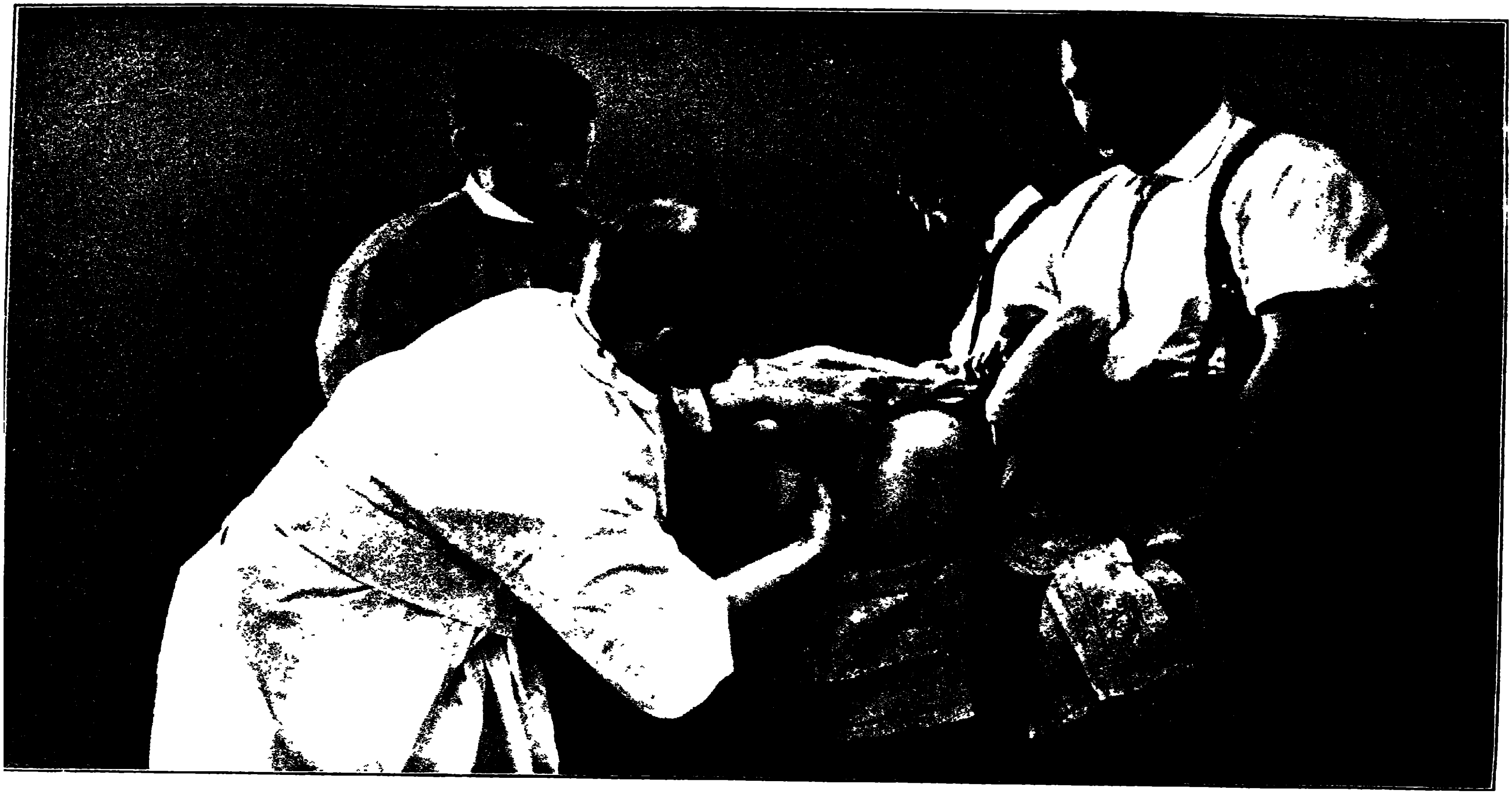
PLATE XXI.



Method of Catheterizing the Puerpera

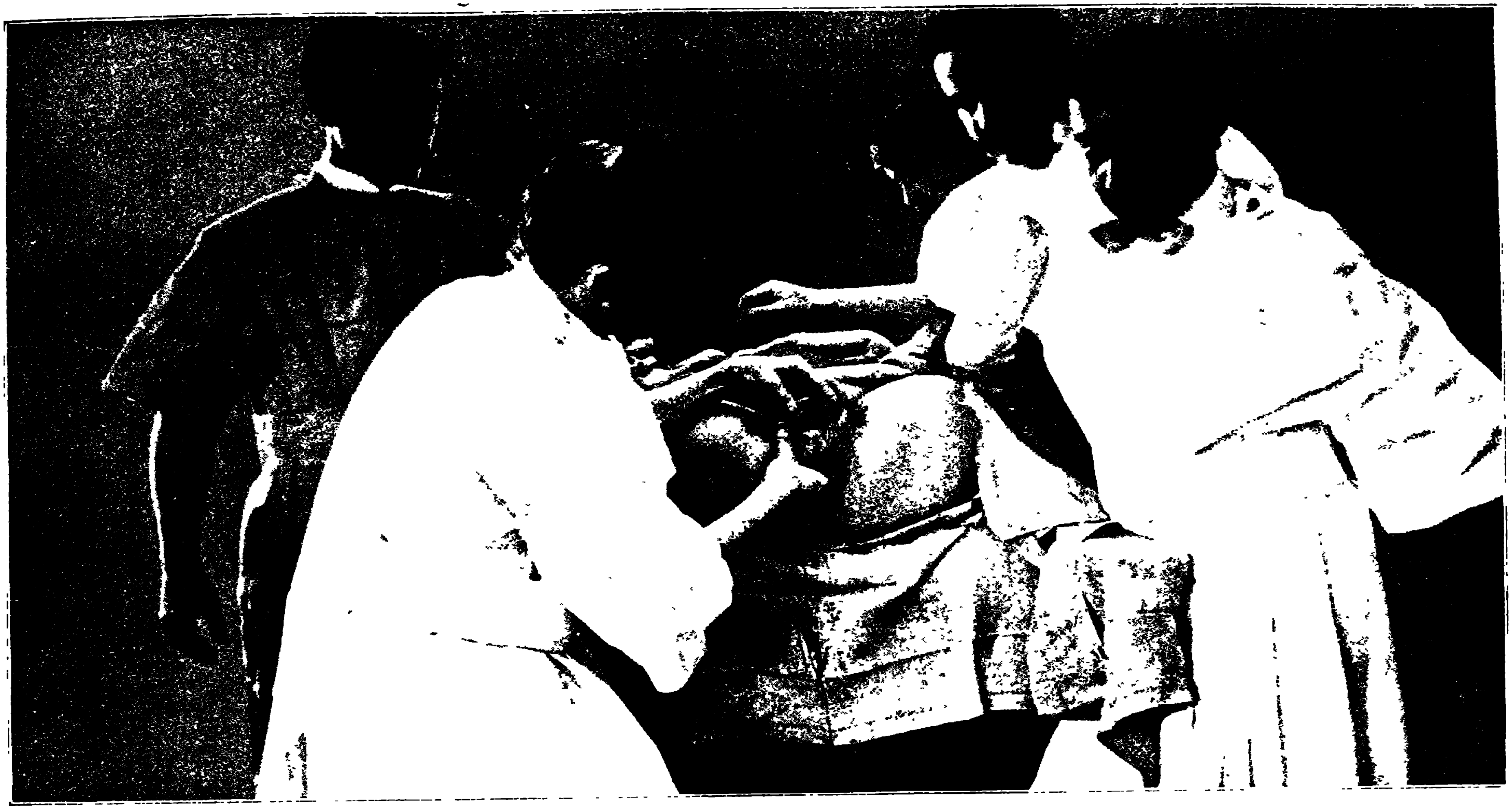
A. Wiping off the Vestibule. B. Inserting the Catheter by Sight.

PLATE XXII.



Maintaining Flexion. The Index in the Rectum Presses on the Fætal Chin, whilst the Index and Thumb of the Other Hand Press the Sinciput Downward and Backward

PLATE XXIII.



First Stage of Extension The Suboccipital Point having Engaged Under the Pubic Arch, the Chin is Allowed to Leave the Sternum

such as 20 grains by the mouth or 30 by the rectum, occasionally appears to evoke contractions. Should these measures fail and the woman show evidence of exhaustion or the fœtal heart point to a similar condition impending, delay is no longer advisable, but the physician must apply the forceps as is indicated in the chapter dealing with this instrument.

Descent and rotation having occurred, we pass to the consideration of the management of the final stages of the expulsory phenomena. When the presenting part reaches the pelvic floor, undergoing the normal mechanism, the resistance to be overcome is that which is offered by the muscles and the fascia of the introitus of the vagina. This resistance must yield after a gradual manner, else the structures will be damaged. Relaxation and retraction must occur and the accoucheur may materially assist by retarding progress of the presenting part and by maintaining the proper relation of this part to the diameters of the outlet. Whenever there does not exist disproportion between the object which aims to emerge and the parts through which this object must pass, the line of action is as follows: Let us take, for example, the most frequent position of the vertex: Rotation occurs so as to bring the occiput under the pubes. We have noted that the shortest diameter of the fœtal head is the suboccipito-bregmatic, and that this engages in the antero-posterior diameter of the outlet. The head must remain well flexed in order that its favorable diameter may offer in this diameter of the pelvic outlet. Further, in order that the head may emerge without damaging the maternal structures, slow extension must take place. The cardinal points to remember, therefore, are that extension must be delayed until the suboccipital point has become fixed under the pubes, and that then, and only then, extension after a gradual fashion should be allowed. (Plates XXII and XXIII.) The teaching of "support of the perineum" has been of great harm as regards the maintenance of the integrity of the maternal soft parts. It is not the perineum which needs support. It is the head which must be delayed in its progress until the muscular structures have relaxed, as they inevitably will unless diseased, and extension must be prevented until the proper diameter of the head has engaged at the outlet under the pubic arch. If anything is to be "supported" it is the fœtal head, and the support given is in the line indicated. In the normal case the perineum need not be touched. Reference to the plate shows how the thumb of the attendant is delaying advance and, at the same time, promoting flexion until the structures have yielded and until the suboccipital point is engaged under the pubes. This accomplished, the patient is anæsthetized momentarily to the surgical degree, and, in the intervals between the pains, the head is shelled out over the perineum. In case, for one or another reason, it is inadvisable to administer an anæsthetic to the surgical extent, the woman is counseled to avoid all expulsory effort. She is told to open her mouth and to call out during a contraction, thus nullifying the effect of the abdominal contractions, and then the head may be gradually peeled out over the pelvic floor. (Plate XXIV.)

The methods still figured of the "support of the perineum" should serve as warnings what not to do. The thumb applied to the head and, if need be, the index finger inserted into the rectum, in order to enable the extension to be of the most gradual type, is the proper way to deliver the head, under normal circumstances.

Stretching of the muscles of the pelvic floor should be avoided, since such action leads to increase in the action of the uterus and to spasm of the muscular structures of the floor.

The head having been shelled out over the perineum, it is supported in the hand until external rotation, or restitution, takes place. (Plate XXV.) Next the shoulders must be delivered without lesion of the maternal soft parts. Under the normal mechanism, with which, at the present, we are alone concerned, the shoulders rotate antero-posteriorly, the anterior becoming fixed under the pubic arch and the posterior sweeping over the pelvic floor and out at the posterior commissure. When the head has been delivered the nurse follows down the fundus of the uterus or the physician does so with his disengaged hand. The object of this is to cause the uterine walls to remain in close apposition to the fœtus,—a point of exceeding importance in case of presentation of the pelvic extremity,

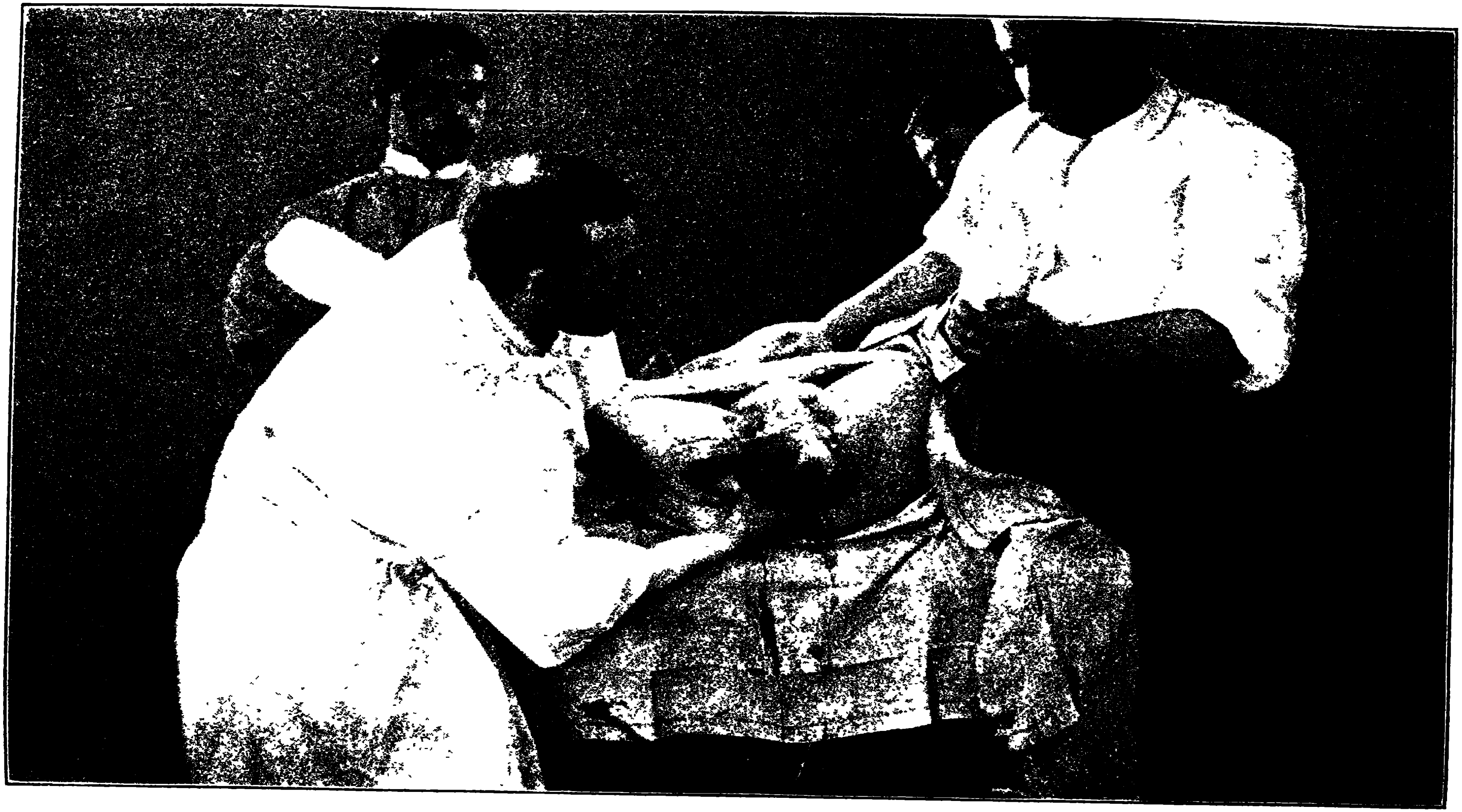
PLATE XXIV.

The Head is Gradually Extending, the Perineum is Retracting and Relaxing.

PLATE XXV.

External Rotation, or Restitution

PLATE XXVI.



Delivery of the Trunk. The Anterior Shoulder Emerging from Under the Pubic Arch.

PLATE XXVII.

Clamping the Cord and Cutting Between the Clamps.

since thus extension of the arms above the head is prevented. In case of inefficient contractions after birth of the presenting part it is necessary to re-enforce them, since, the presenting part being in the world, the life of the fœtus may become imperiled through pressure exerted on the umbilical cord. Whilst, therefore, it is wise to await the recurrence of normal contractions, in the event of these being delayed, the attendant, by pressure over the fundus of the uterus, may assist in the expulsion of the remainder of the fœtus, this pressure being aided by traction on the portion of the fœtus which is in the world, such traction being made in the axis of the pelvic outlet,---that is to say, directly downward. (Plate XXVI.) In case of further delay, the finger inserted under the pubic arch or over the posterior commissure, according as one or the other arm is accessible, hooks this arm down and delivers it by a procedure of flexion and extension over the ventral surface of the fœtus. During extraction of the arms the woman should be still counseled not to bear down excessively, for sudden emergence of the arms is apt to damage the pelvic floor.

The arms having been extracted, the trunk follows rapidly, in case of presentation of the vertex; and in case of presentation of the pelvic extremity, if the normal mechanism is followed,---that is to say, if the occiput rotate anteriorly in a position of thorough flexion, a position which may always be maintained by suprapubic pressure,—the after-coming head emerges, by its shortest diameters, in turn.

As the child is born it is supported by the nurse until the umbilical cord is tied.

Where the child is strong and cries lustily the cord may be tied without special delay; but if the reverse is the case it is desirable to wait a few minutes in order that the fœtus may receive as large an amount of blood as possible. In case the child is born asphyxiated it is necessary to tie the cord as rapidly as possible, or to clamp it and to cut between the clamps, in order that the measures requisite for resuscitation may be resorted to. (Plate XXVII.)

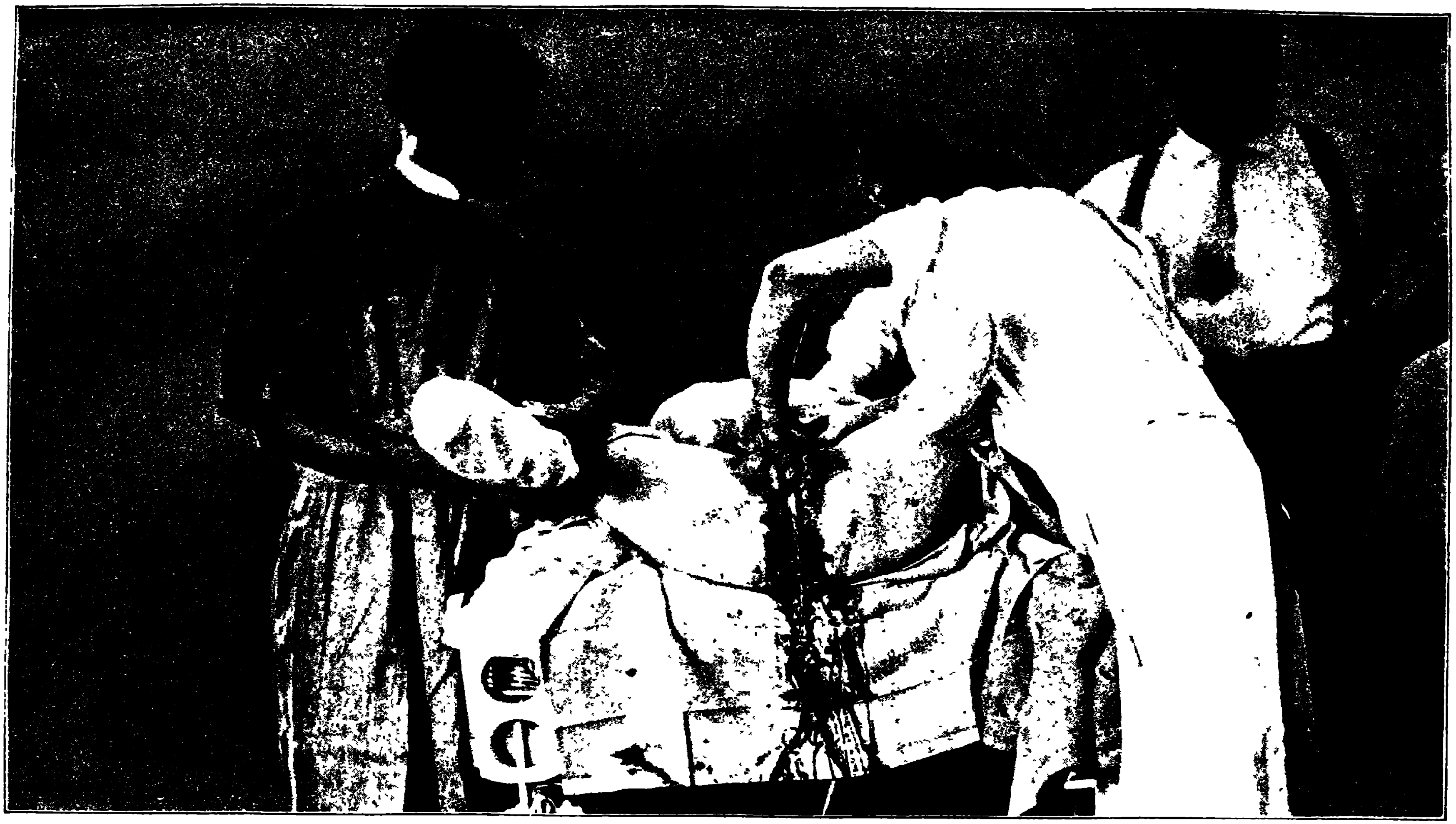
The cord should be tied at two places,—the first about one inch and a half from the umbilicus and the second three to four inches nearer the mother. Boiled silk-worm gut forms an excellent material for ligature, since thus we minimize the risk of infection of the fœtus at the umbilicus. Whatever the material used, it should be thoroughly sterile. Ligation is accomplished by making a single knot and then carrying the ends around the cord and tying in the surgical knot. Thus we avoid risk of slipping, which might entail hæmorrhage and fœtal death. The object of the second, or the ligature on the maternal side, is twofold. In the first place, a second fœtus may lie in the uterus with common placenta and amniotic sac, and if the cord be not ligated toward the mother the life of the twin would be imperiled. Secondly, it would seem as though the expulsion of the placenta were facilitated if the retraction of the uterus take place on a firmer placenta, as the organ necessarily is when filled with blood. In case the umbilical cord is very thick, before applying the ligature it is advisable to strip the cord of its gelatinous covering, since then the vessels may be the better secured and there is less risk of hæmorrhage.

The cord having been tied, it is cut between the ligatures and the child is handed to the nurse. The care which it should have, as well as the measures for resuscitation, should it be asphyxiated, will receive attention in the chapter treating of the "Care of the New-born Infant."

With the expulsion of the body of the fœtus there follows a gush of fluid consisting of the residual liquor amnii and of blood. The uterus, it has been noted, should be followed down as the child is expelled, and the hand should keep control of it during the next, or the third, stage of labor.

After the expulsion of the child the uterus, as a rule, rests for a variable interval, regaining tone, as it were, in order to retract and expel the placenta. Occasionally, when the contractions are very energetic, there is no appreciable pause, but as soon as the child is born the placenta follows. This, however, is the exception. It is important to remember that, as a rule, there is a decided interval between the end of the second and the beginning of the third stage

PLATE XXVIII.



Manual Expression of the Placenta.

PLATE XXIX.

Delivery of the Placenta by Manual Expression.

of labor; otherwise injudicious and premature attempts may be made to accelerate the third stage, with results of an untoward nature. It has been noted that separation of the placenta occurs through the splitting of the serotinal layer, and that concomitantly the uterine walls retract, squeeze down upon the placenta, and drive it into the vagina. The course for the attendant to pursue is to keep his hand on the uterus for a few minutes to guard against undue relaxation, and then, when the uterine globe is felt to harden under the hand, to assist in the expulsion by the method of manual compression, which is known after Credé, who first systematically described it. (Plate XXVIII.) The procedure is as follows: The radial surfaces of the hands are applied at the fundus of the uterus, the palms of the hands resting over the body of the organ, the thumbs meeting in the midline. When the uterus is felt to harden, pressure is made by both hands in the direction of the plane of the pelvic inlet. Thus the muscular force of the hands of the physician is added to the contractions of the uterus, and often, at the first attempt, the placenta is not only expelled from the uterus into the vagina, but out of the vagina into the bed. Rarely, however, is the first attempt successful. Where it fails, the attendant keeps his hands in position and awaits a second uterine contraction. Should this not tend to recur, or should it be feeble, gentle massage of the uterus will often evoke stronger contractions. Patience is requisite and the uterus should not be spurred into action before it is ready to act,—that is to say, before it has regained tone. Usually from fifteen to thirty minutes elapse from the termination of the second stage of labor until the end of the third stage. This is entirely within physiological limits, and if no complication offer, such as hæmorrhage, delay to this extent need give rise to no anxiety.

As the placenta emerges at the vulva it is received in the hand and held there until the membranes are shed. (Plate XXIX.) In normal cases the membranes follow the placenta at once, but frequently, after the uterus has expelled the placenta, the lower uterine segment contracts and the membranes are nipped. This is particularly apt to occur where attempts have been made to hurry the third stage or where the uterus has been irritated by overzealous massage. In the event of the membranes becoming caught as described, the policy to pursue is to allow the uterus to relax a trifle, when, without difficulty, the membranes emerge. The teaching, that when the placenta has been delivered the membranes should be rolled into a cord in order to enable their extraction intact, is a common cause of so-called retention and "morbid adhesions" of the membranes. The fact is that, when the membranes are twisted, if the internal os should close down a portion of the membranes are inevitably torn off. Adherent placenta and retention of the membranes become very rare as the physician familiarizes himself with the proper conduct of the third stage of labor. Such occurrences are due either to pathological changes at the placental site or else the adhesion and the retention is only apparent, the placenta having become detached or the membranes being torn off by the method of delivery and remaining incarcerated in the uterus through the shutting down of the lower uterine segment.

It will be noted that we have avoided referring to a prevalent method of placental delivery,—traction on the cord. This method is to be rejected on the ground that resort to it is unnecessary, and that it may prove dangerous. When we recall the normal mechanism of placental expulsion it is apparent how futile traction will be before separation of the placenta at the serotina has occurred. If the attachment be a firm one, what is needed is patience in order to await the natural separation which is an associate of the natural retraction of the uterus. Traction will simply irritate the organ, and, should it be forcible enough to cause detachment in advance of the normal mechanism, the venous sinuses of the uterus will not have a chance to close after the requisite normal fashion, and the woman becomes subject to the risk of hæmorrhage. After normal separation of the placenta traction on the cord may certainly be effective in the delivery of the placenta, but resort to such a method is unnecessary, since the normal mechanism is sufficient. Further, in a given case we are never aware that the placenta is not adherent, and, if we make traction under such circumstances, the effect is simply to pull off a portion, or else, if the uterus be atonic, to pull down the site of placental implantation, and thus to favor inversion of the uterus. It may be laid down as a cardinal rule that, if the placenta cannot be expelled within a reasonable interval by the natural powers, assisted by manual compression, it is adherent, or else that it is incarcerated above the lower uterine segment, in which event traction on the cord is also bound to fail in effecting delivery, and manual extraction will be necessary. Just so far as the normal mechanism of the shedding of the placenta is borne in mind, and just so far as the physician is familiar with the manner of application of Credé's method, just so infrequently will he resort to extraction of the placenta through traction on the cord. When the uterine globe is felt to harden effectually, becoming smaller and remaining so, then, if the placenta has not appeared at the outlet, the inference is allowable that it has simply been expelled into the vagina. In such an event the examining finger will detect it in the vagina, and then traction on the cord is allowable to remove it from this passage.

When the uterus has been emptied it ordinarily will contract into a hard mass like a cricket-ball; but for some time it is very apt to undergo relaxation, and therefore the golden rule to keep the hand on it for at least one-half hour after delivery, in order to guard against relaxation and post-partum hæmorrhage.

After the delivery of the placenta and membranes they should be carefully examined in order to determine if they are entire. Not alone should the fœtal surface be looked at in order to be assured that the two layers of the amnion are present as well as the chorion, but the maternal surface should be most carefully scrutinized in order to detect absence of a cotyledon or deficiency in a large part of the placenta. This precaution should never be neglected, since the normal course of the puerperal state depends on the absolute emptying of the uterus. In the event of there being any doubt as to the integrity of the placenta or the membranes, then the interior of the uterus should be at once explored. Under strict aseptic precautions the hand is inserted into the uterus, the organ being depressed as much as possible by the other hand. The cavity is carefully explored and whatever remnant is found is removed. It is far easier to explore the interior of the uterus after this fashion immediately after labor, when the vagina and the uterus are wide open, than a number of days afterward, as will become necessary if the retained remnants are not detected until symptoms of septic infection set in. All that the physician need remember is the necessity of absolute cleanliness and of gentle manipulation.

When satisfied that the uterus is empty, ergot should be administered, in the dose of 1 drachm, by the mouth. The necessity for the administration of ergot is disputed. Unquestionably, under physiological conditions, the uterus will contract after delivery and remain in that state of contraction which is so essential to the smooth course of the puerperal state. But women rarely approach labor or pass through it in a strictly physiological manner. As a rule, under the pressure of our high civilization, nervous strain is exaggerated during pregnancy and intensified during labor. The result is that the contractility and retractility of the uterus stand in need of re-enforcement, as it were, and this may be secured through the administration of ergot. The drug can do no harm, and extended experience would seem to prove that its administration, after the completion of the third stage of labor and during the first few days of the puerperal period, assists in maintaining due contraction and thereby hastens involution. This, however, is the only time when ergot should be given. During labor it has no place. We possess far safer means of accelerating deficient contractions, and, if an indication offer for the speedy termination of the labor, the minor operative measures, being under the control of the physician, are far safer for the woman than the action of a drug the property of which is to set up and to maintain contractions in a manner often beyond our control. The distinctive property of the drug should ever be borne in mind. If administered during labor it may at once lead to the speedy expulsion of the child, but it may also lead to tetanic spasm of the uterus, whereby the life of the fœtus is imperiled, and whereby, also, should operative interference become necessary, this is nullified or rendered dangerous, owing to the spasm which has been evoked. Further, ergot administered during labor may affect chiefly the lower uterine segment, and the fœtus becomes incarcerated, or, the upper segment remaining relaxed, hæmorrhage may ensue, which will kill the child and excessively endanger the woman.

After the expulsion of the placenta there occurs a loss of a variable amount of blood, the overflow, as it were, from the uterine sinuses. This is physiological, and, as a rule, the uterus contracts and remains so, the further loss being the lochia, which is a discharge consequent on the involution of the uterus. Where the labor has been protracted or where it has been necessary to resort to surgical anæsthesia, the loss of blood may be considerable, leading to what is termed post-partum hæmorrhage and constituting one of the most alarming of obstetrical complications. This post-partum hæmorrhage may set in immediately after the completion of the third stage of labor or a number of hours afterward. Even at a still later date hæmorrhage may occur,—called secondary post-partum hæmorrhage; but such an occurrence is due, usually, to the presence of a foreign body in the organ, such as a portion of the placenta, and is not dependent on atony of the organ, as is the type of bleeding we are now considering.

Post-partum hæmorrhage is caused by deficiency in the contractility and retractility of the uterus. Long-continued labor; exhaustion of the woman; sudden termination of the labor, especially of the placental stage; the presence of a tumor, such as a fibroid, in a segment of the uterus leading to unequal contraction,—such are the causes of post-partum hæmorrhage. Where nerve-tone is at par, and the woman has passed through her labor after a physiological manner, and the uterus has been absolutely emptied of all remnant of placenta and of membrane, the occurrence of hæmorrhage is excessively rare; still, after every case, the possibility should be borne in mind and the physician should be prepared to meet the complication.

The minor bleeding may be met by the administration of ergot by the mouth or hypodermically, and by gentle massage of the uterus. The source of the hæmorrhage should be carefully differentiated. It should be borne in mind that profuse hæmorrhage may come from a lacerated cervix through involvement of the circular artery or from extension of the rent higher up into the broad ligament. Of course, the treatment of such a lesion will be vastly different from that of oozing from the uterine sinuses. Under aseptic precautions, therefore, the first step in every case is to investigate the cervix. After labor the margins of the cervix are flabby and in contact with the vaginal walls, and, therefore, the simple vaginal touch is uncertain in making the diagnosis. The woman being on her back, the cervix should be seized between the thumb and fingers and brought down to the introitus of the vagina, when, under inspection, the extent of the lesion, if any exist, may be determined. It can then be repaired after the method described in the chapter dealing with "The Surgery of the Puerperium" ("Obstetric Surgery"). If this source of hæmorrhage has been excluded, then, unless the bleeding be profuse, the milder methods may be tested for controlling it. Such methods are: massage of the uterus and the hypodermic injection of ergot; the injection into the uterus of water at a temperature of 115° F.; the insertion of ice. These are the only measures we can approve of. In a strict emergency, where the physician is not prepared with all that is requisite, the injection of vinegar into the organ is allowable, but we unqualifiedly condemn the use of iron. Iron injected into the uterus, in the form of the subsulphate, is without question a powerful styptic, but the clots which are formed are very liable to decompose and septicæmia is a likely result of its use. Besides, to-day there is no excuse for the use of iron or iodine or other styptic. We have seen that amongst the things which should be in the well-prepared lying-in room is sterilized gauze, and it is a good rule for the physician to carry such gauze with him whenever he is summoned to a case of labor.

If the milder means of checking post-partum hæmorrhage through evoking uterine contractility and retractility fail,—such as the hot intra-uterine douche, massage of the uterus, and the injection of ergot,—then the time has come for resort to the one certain means of controlling the hæmorrhage, and this is the intra-uterine tamponade. But little time should be lost in resorting to this measure, for the woman, exhausted by the efforts of delivery, cannot stand the loss of much blood, and, if we dally overlong she may sink into collapse or lose enough to pass into a condition of acute anæmia often of a rapidly fatal type.

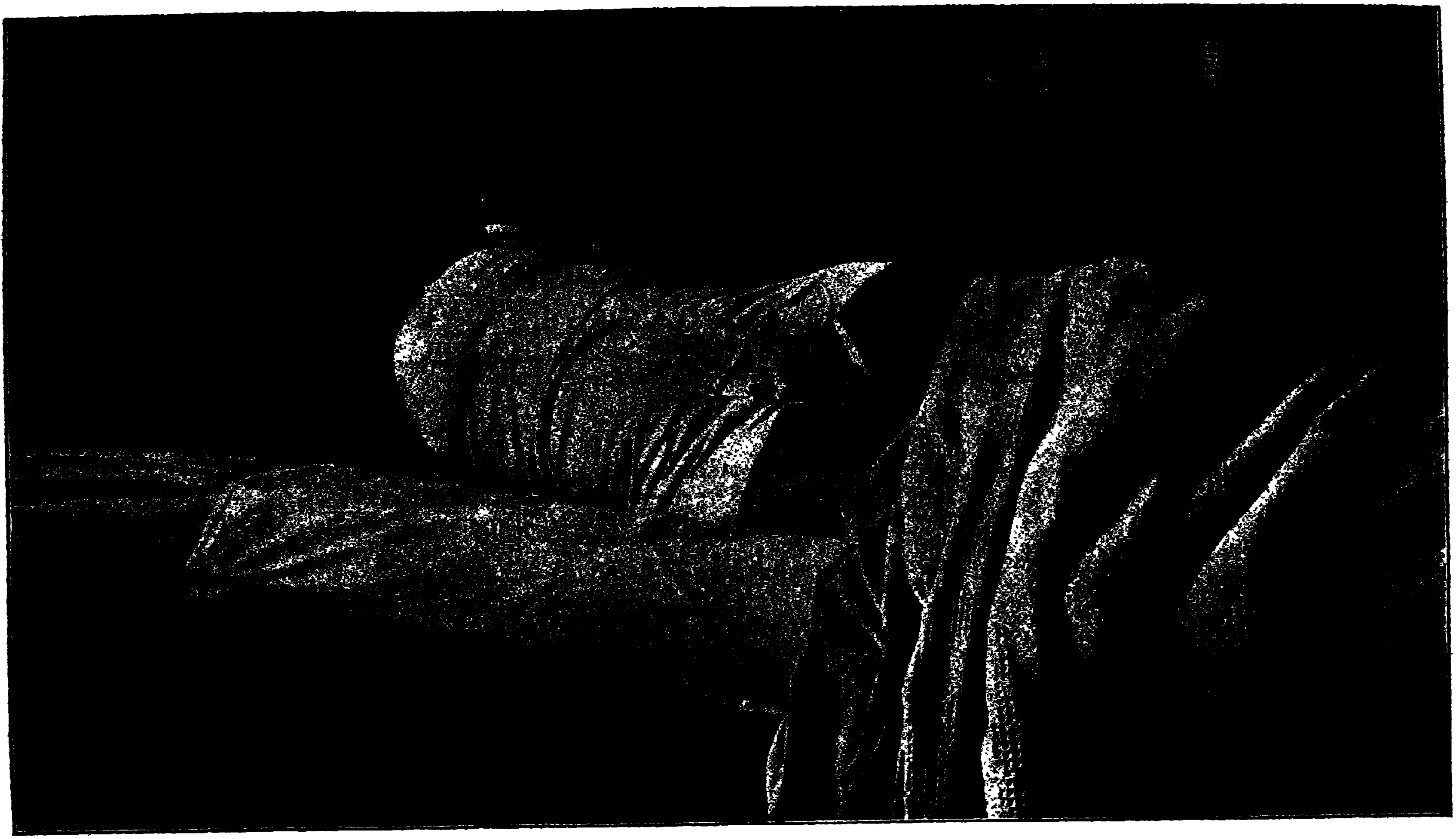
It has been proved that the intra uterine tamponade is not alone effective, but safe. It was feared that the hyperdistension of the uterus caused by the firm tamponade would interfere with retraction after the removal of the tampon. This, however, has been proved a groundless fear. The uterus, as a rule, contracts firmly when the tampon is removed, and remains contracted. Should there be any tendency to permanent relaxation it is a simple matter to tampon it again.

The gauze for purposes of the tamponade should be two inches in width, and fully five linear yards will be needed. It must be emphasized that this gauze must be sterile, and, further, that every step of its insertion must be sterile. After labor at term, where the uterus is wide open, as it is customary to find it in case of hæmorrhage due to want of tone, it is a simple matter to pack this gauze in the uterus by the hand, the other hand controlling the organ through the abdominal wall. What we are aiming at is control of the bleeding through compression of the bleeding-point, so to speak, and, therefore, the uterine cavity must be packed full and the upper vagina as well. This packing may be left in for at least thirty-six hours, when, under careful asepsis, it is removed, and, if the uterus is still atonic, the cavity is washed out with hot sterilized water and a new packing inserted. Whilst the gauze is in place the chances are that the woman will have to be catheterized, and this should be done by sight after careful precedent cleansing of the vestibule.

In order to counteract the anæmia caused by loss of blood the usual methods of stimulation should be resorted to, such as whisky or brandy, hypodermically; strychnia, $^1/_{16}$ grain, hypodermically, repeated hourly for three or four doses; but the best means of all for restoring the quality and the quantity of the blood is resort to hot saline infusion. In conditions of acute anæmia it is a very difficult matter to resort to venous infusion, since it is hard to find the calibre of the collapsed vessel and the apparatus is never at hand. It has been found that injection of 1-per-cent. hot saline solution into the cellular tissue of the back or abdominal wall is very effective, and a number of pints may thus be given. All that is necessary is a clean syringe and a large hypodermic needle. It is questionable, however, if, in the average case, injection of the same solution into the rectum be not as effective. The rectum rapidly absorbs hot salt water, and we avoid the risk of abscess in the cellular tissue, which we are liable to get if the instruments used and the solution and the surface of the skin be not aseptic, and in our hurry to meet the emergency there is ample loop-hole for error in technique. The hot (115° F.) saline (1 per cent.) solution is injected into the rectum, about 2 quarts being used, and this procedure is repeated to advantage hourly until the quality of the pulse improves. All of this solution is, of course, not absorbed, but sufficient is to stimulate the heart-action and to improve the quality of the blood.

The placenta and the membranes having been delivered, and the uterus remaining thoroughly contracted, the next step is to cleanse the woman's genitals and to apply the puerperal binder. If the delivery has been conducted after that aseptic fashion which should alone be tolerated to-day, there is no call for the administration of a vaginal or the intra-uterine douche. In case, however, there is any reason to question the strict asepsis of the different steps necessary for delivery, then it is wise to administer one douche, and this should be the last during the puerperium unless certain symptoms develop, stress upon which will be laid in the chapter dealing with the puerperal state. According to individual custom, this douche may consist of a 2-per-cent. solution of creolin or a 1 to 2000 solution of bichloride of mercury. It goes without saying that the syringe should be sterile, as well as the hands of the

PLATE XXX.



The Puerperal Breast and Abdominal Binder and the Vulvar Pad.

attendant who administers the douche. For both intra-uterine and vaginal douching immediately after the completion of labor, the ordinary glass tube attached to a bulb or a gravity syringe is the best. In case the douche is intra-uterine, the physician alone is competent to give it. Such a procedure should never be intrusted to the nurse.

The external genitals of the woman are carefully washed with a 1 to 2000 bichloride solution, and then the sterilized gauze pad is applied to the genitals, and this is pinned, back and front, to the abdominal binder.

Whilst the application of the abdominal binder can have no effect, as is the popular belief, on the restoration of the form of the woman, it nevertheless holds true that she is more comfortable if it be used. For a considerable time the abdomen has been subject to the strain of distension, and the sudden relief of this strain seems to call for some support. The binder is applied mainly for the above reason, except in those instances where there is reason to anticipate relaxation of the uterus, and then the binder serves the purpose of holding in position the pad which it is customary to place above the fundus of the uterus to guard against relaxation. (Plate XXX.) The preferable binder is made of unbleached muslin, gored at the sides to fit over the hips. It is pinned firmly so as to give support, never to such a degree as to press the uterus out of its natural relations to the abdominal cavity.

The binder and the pad having been applied and the soiled draw-sheet having been removed, the woman lies in the clean bed and the puerperal state begins, the management of which is considered in a separate chapter.

ABNORMAL LABOR.

Thus far we have traced the course of normal labor. Abnormal labor may depend on deviation from the course of the customary phenomena, either through abnormity in the mechanism or in the position of the presentation. We would lay renewed stress on the fact that any variety of presentation may terminate normally, provided the necessary mechanism be followed. Thus, even as we may have deviations from the normal in case of presentation of the cephalic or pelvic pole of the fœtus, even so may the face and the shoulder presentations terminate normally, provided only that the mechanism requisite for delivery be followed. It serves no useful purpose, therefore, to describe the course of labor under the various presentations. If the requisite mechanism in each case be fully understood there is need for description only of the complications the result of such position of the presenting part as necessarily entails defect in the mechanism.

Under this definition we pass to the description of

ABNORMAL VERTEX PRESENTATION.

It will be remembered that, in order that presentation of the vertex may start the normal mechanism from the pelvic brim under the best possible conditions, the head should present in a position of flexion, which becomes intensified as, under the uterine contractions, engagement and descent take place. Occasionally the vertex presents semiflexed, or, practically, the brow of the fœtus offers instead of the occiput. Under such circumstances, as the uterine contractions tend to cause engagement, one of two things happens: Either the brow becomes converted into a presentation of face or else flexion occurs and we obtain the more favorable presentation of the occiput. The cause of this semiflexed position at the superior strait will usually be found to be an obliquity of the uterus, the result of which is that contractions of the uterus do not act on the short arm of the lever, but on the long arm, and consequently the head offers semiflexed instead of flexed. The rectification of such an anomaly, in case it be recognized before engagement, suggests itself. It consists simply in applying a bandage with an underlying pad over the side toward which the uterus inclines, with the result that the obliquity is rectified; or, the woman may be made to lie on the side opposed to the obliquity, when, under the force of gravity, the obliquity is rectified. In the event of the position being determined, as will ordinarily be the case, after engagement and before the rupture of the membranes, then, by means of suprapubic pressure on the occiput and applied pressure on the forehead by the finger in the vagina, there may result proper flexion of the head, which is what should be aimed at. Ordinarily, however, if the head enter the pelvic inlet in this semiflexed manner the result of the contractions will be to convert the position into one of the face, when, as we have seen, if anterior rotation of the chin take place delivery is perfectly possible through a normal pelvis, only the stages of labor—the dilating and the expulsory—are protracted. We will speak of this further under the subject of "Face Presentations."

Under the subject of "Mechanism of Labor" stress was laid on the untoward nature of posterior positions of the vertex where anterior rotation failed. It was further stated that, in the majority of instances, anterior rotation probably occurred, even though delayed until the occiput reached the pelvic outlet. Still, we are never in a position to predict the case where this anterior rotation may not fail, posterior rotation into the hollow of the sacrum being substituted. In view of the untoward effect of such rotation on the woman and the child, it seems wise to advocate the conversion of the posterior occiput into the anterior as soon as it is detected, and so long as the conditions essential to success without damaging the woman or the child are present. When recognized at the brim, before rupture of the membranes and before deep engagement, two courses are open to us,—the one is version and the other is the manual rectification. Where the pelvis is normal and the child is not too large for the pelvis, version does not seem to us called for. If the cervix is wide enough open to permit of version or if it be dilatable enough, then the insertion of the entire hand into the vagina and the grasping of the child at the neck and rotation of the fœtus, and, therefore, of the occiput into the anterior plane, as specifically described in "Obstetric Surgery," suggests itself as preferable. This entails anæsthesia, but so also does version. The advantage gained, provided the fœtus can be made to occupy the position into which it is altered, is that the chances of the delivery of a living child are greater than when the fœtus is made to engage by the after-coming head, as is necessarily the case after version. Where disproportion between the fœtus and the pelvis exists, on the other hand, it is preferable to elect version, since, in dystocia, due to this cause, the after-coming head molds better than the before-coming. Where the head has engaged by its greater segment before the posterior position of the occiput is determined, then, should the membranes have ruptured, both manual rectification and version are contra-indicated, and the duty of the attendant is simply to watch both the mother and the fœtus in the hope that anterior rotation may occur. Of course, the labor will be tedious, but interference will not be allowable unless either the woman or the fœtus shows signs of exhaustion. In such an event the best that the attendant can do is to apply the forceps and deliver, with the consequent necessary damage to the pelvic floor, unless, even during extraction by the forceps, anterior rotation should occur.

Rarely, in connection with presentation of the vertex, prolapse of a hand or of the cord occurs. Prolapse of the hand by the side of the head delays the labor, because it interferes with the requisite mechanism of labor. The treatment consists in the endeavor to push up the hand, and, this accomplished, if the membranes have not ruptured, then it is wise to break them, in order that, the vertex descending into the cervical ring, the hand cannot prolapse again. Rarely will it be necessary to resort to version to meet this abnormity. If the presenting part has engaged with the hand prolapsed, then it probably will not be possible to replace the hand, and the delay in the labor may be such as to threaten exhaustion, and then the forceps will be indicated to terminate the delivery.

Prolapse of the cord in case of vertex presentation is uncommon, compared with the occurrence in connection with presentations of the pelvic extremity. If it be determined before rupture of the membranes and engagement, then postural treatment will often answer for the correction of the prolapse, or, at any rate, the cord may be saved from pressure during the contractions until sufficient dilatation has occurred to enable us to either rupture the membranes and push up the cord before the head has a chance to engage or else to resort to version.

Very exceptionally we note what is termed an "inclined" presentation of the vertex. In such cases the ear or the parietal protuberance presents at the centre of the superior strait. Such presentations are the result of obliquity of the uterus. In case this presentation does not become rectified, then, since the long occipito-mental diameter of the head offers at the superior strait, arrest of the head necessarily occurs and termination of the labor under the natural efforts is impossible. As soon, therefore, as this presentation is recognized, interference is called for at a time when assistance is comparatively easy, since, if the head become impacted, destruction of the fœtus through diminution in its bulk is the only method of delivery. When the head is still movable, if the membranes are unruptured, as soon as there is sufficient dilatation of the cervix, version is the operation of choice. In case the membranes have ruptured, the whole hand should be introduced into the vagina, the occiput is to be seized, and, during the absence of a contraction, the head is to be pushed up and flexion is to be secured. This, however, is not sufficient, but the head must be maintained flexed until the recurring uterine contractions have caused it to engage in the favorable position. If this manipulation is impossible, then, under deep surgical anæsthesia, whereby the uterus is relaxed as much as possible, the manipulation may succeed. This failing, the only resort, short of craniotomy, is a tentative application of the forceps. We lay stress on the word *tentative*, for, the forceps being applied above the pelvic brim and necessarily grasping the fœtal head so that the long occipito-mental diameter offers at the superior strait, it is questionable, unless the head be small in relation to the given pelvis, if traction will suffice to promote flexion and to cause engagement without the infliction of considerable traumatism on the maternal parts. The good rule, where version and restitution by the hand fail or are contra-indicated from the start, is to resort to craniotomy, unless, in full view of the increased risk, the woman or her representative elect symphysiotomy or the Cæsarean section. These operations will always be contra-indicated when the woman or the fœtus shows signs of exhaustion, since a major operation resorted to in the presence of exhaustion of either can but result in the delivery of a dead fœtus at the greatly-increased risk to the woman's life.

FACE PRESENTATIONS.

Our study of the mechanism of labor has taught us that presentations of the face may terminate under the natural efforts, provided that rotation occurs with the chin to the pubes. It is a fact, however, that, under the most favorable conditions, face presentations prolong labor unduly, and that there is always imminent risk of maternal and fœtal exhaustion. Further, even though the face enters the superior strait with the chin pointing to the antero-lateral plane, in a given case we can never feel sure that, on reaching the pelvic floor, posterior rotation may not occur. The evident corollary is that a presentation of the face, when recognized before engagement, should always, where feasible, be treated either through conversion into a presentation of the vertex by a mechanism of flexion or else that version should be the operation of election. Where the membranes are unruptured, the cervix is dilated or dilatable, the woman being anæsthetized, the hand should be introduced into the vagina and, during the interval in a contraction, the occiput should be seized and the head flexed. This manipulation is not alone sufficient, but the head must be maintained flexed until, under the influence of the uterine contractions, the flexed head has engaged. Manipulation of this nature will rarely be successful without the membranes becoming ruptured, and then, if the manipulation should fail, one of the necessary conditions for version is absent. Unless, therefore, the pelvis be roomy or the child small, we favor the conversion of a face presentation into one of the pelvic extremity by version, when it is recognized at a time when this operation is not contra-indicated. That is to say, the membranes being unruptured, or, if they have just ruptured and the presenting part has not engaged, the cervix in each case being dilated or dilatable, version should be the operation of election.

Where the face has entered the cavity with the chin pointing to one or the other antero-lateral plane, then the duty of the attendant is to stay by his patient and to watch the mechanism carefully. In case there appears to be a tendency to posterior rotation he must interfere, in order to avoid the occurrence of a position which can alone be delivered with safety to the woman through craniotomy. The assistance which may be rendered by the physician consists simply in an attempt to favor anterior rotation of the chin. The most feasible way to do this is to apply the hand to the posterior cheek and to keep it there during contractions of the uterus, in order to prevent the rotation of the chin toward the sacrum. This manœuvre certainly favors anterior rotation, and often after a rapid fashion, thus avoiding a very tedious labor and consequent deleterious pressure on the maternal soft parts and injurious prolonged extension of the fœtal neck.

A partial presentation of the face is simply a presentation of the brow. Such a presentation, if not converted into one of the occiput or even of the face, cannot be delivered by the natural efforts, since the occipito-mental diameter of five inches offers at the superior strait. The indication for treatment, as soon as the presentation is recognized, is to insert the whole hand into the vagina, grasp the occiput, and flex the head. This flexion must be maintained until engagement, otherwise the brow presentation will recur. This manipulation applies, in particular, to instances where the brow presents, the occiput being in front. It is obvious that, in such a case, this is the only method, for, if we convert the impossible brow into a face, we have the equally impossible chin-to-the-sacrum position. Where the brow offers, with the occiput pointing posteriorly, then, if we flex the head, we convert the position into an occipito-posterior, which, we have seen, is an unfavorable position of the vertex. The aim of treatment, in such an event, is to extend the head and to convert the brow presentation into a face, with the chin anterior, or—and this we much prefer—to resort to podalic version if the necessary conditions for version are present,—that is to say, the membranes unruptured or just ruptured, the cervix dilated or dilatable. In case of a presentation of the brow, one or another of these manipulations are called for before the attendant should even think of the application of the forceps. It is simply a mechanical impossibility to deliver a presentation of the brow, before rectification, by the application of the forceps.

PRESENTATIONS OF THE PELVIC EXTREMITY.

The characteristics of a presentation of the pelvic extremity are slow engagement, slow descent, slow rotation, and slow delivery. The pelvic extremity cannot assist in dilatation as can the rounded vertex, and, after engagement, the hips undergo rotation in a more protracted manner than the occiput. A corollary is that the membranes should be maintained intact as long as feasible in order to secure the advantage of the dilating hydrostatic wedge. The normal breech having engaged, the physician need only have patience in the vast majority of cases, simply watching the woman and the fœtal heart-beat in order to interfere if there occur sign of impending exhaustion. Where the pelvis and the fœtus are not disproportionate, and the complete breech presents, it will rarely be necessary to decompose the wedge,—that is to say, to extract the legs in order to favor the emergence of the nates,—the sole precaution here being to follow down the uterus closely as the breech emerges, otherwise the arms may become extended above the head and delivery become very complicated. Not alone must the arms be kept from extending, but the head of the fœtus must be maintained well flexed by suprapubic pressure, for, if extension of the chin take place, the delivery of the after-coming head is exceedingly complicated and usually at the expense of the fœtal life. Indeed, looking at presentations of the pelvic extremity from a broad standpoint, it is the management of the stage of the delivery which may offer difficulties and in which the fœtus is exposed to the greatest risk. Under usual conditions, if maternal exhaustion seem imminent, the labor may always be terminated through extraction even as would be the case had a primary cephalic extremity been converted into a presentation of the pelvic pole. The cardinal rule to bear in mind, therefore, is that, on the emergence of the breech, the uterus must be kept firmly applied to the fœtus, in order to avoid extension of the arms above the head, and that the head in turn must be maintained in a position of flexion except, of course, where the occiput has rotated posteriorly, when, under the necessary mechanism, extension is requisite, in order that the chin may engage under the pubic arch to enable the occiput to make its long sweep over the pelvic floor. The shoulders having been delivered spontaneously, or artificially by flexion and extension over the ventral surface of the fœtus, the sooner the after-coming head is extracted, the better. The child is apt to suffer greatly now through delay. Pressure on the umbilical cord cannot always be avoided and deep asphyxia always threatens. Downward traction on the shoulders, assisted by firm suprapubic pressure, will, in the vast proportion of cases, suffice to deliver the after-coming head, occiput to the pubes. We cannot lay sufficient stress on this downward traction. It is necessary that the suboccipital point should be engaged under the pubic arch before the mechanism of extension of the face over the posterior commissure can take place normally. Rarely, if this point be borne in mind, will it be necessary to resort to the application of forceps to the after-coming head. Further essential details in reference to the management of the after-coming head will be found in the portion of this work dealing with the surgery of obstetrics.

The management of presentations of the incomplete breech—that is to say, of presentation of the feet or foot or of the knee—does not differ from that of the normal pelvic extremity. The same essential points should be borne in mind. The membranes must be maintained intact as long as is possible, and, after delivery of the nates, the uterus must be closely followed down, in order to avoid extension of the chin in case of the normal anterior rotation taking place. There is one complication of these presentations which must be borne in mind as very likely to occur, and this is prolapse of the cord,—an accident which, if not remediable, certainly entails fœtal death. So long as the membranes remain unruptured the fœtus cannot suffer, since direct pressure on the cord is not possible. The attendant, therefore, need only wait and watch, directing the woman to lie, by preference, on the side opposed to that on which the cord tends to fall. This waiting policy is called for, since, until the cervix has dilated or is dilatable, interference of an active nature is unlikely to save the child, for delivery cannot be effected quickly enough with regard to the integrity of the maternal parts. By watching, the physician may take advantage of the period when rupture occurs in order to push up the cord and enable the presenting part to engage and to fill the upper pelvic strait so that there is no space for the cord to slip down.

Such conditions, however, are rather ideal ones. In the first place, prolapse of the cord will only exceptionally be recognized prior to rupture of the membranes. The physician, however, should always remember the possibility of this in incomplete pelvic presentations, and accordingly be prepared to act. If the prolapse occur and the cord cannot be replaced before engagement, then the course of action is to place the cord in that part of the pelvis which is least exposed to pressure, which varies, of course, according to the position of the presenting breech. During the further progress of the mechanism, should the pulsations of the cord become weak or cease altogether, it stands to reason that the sole hope for the child lies in delivery after as speedy a fashion as is consistent with the safety of the woman. The foot or the knee presenting, this is seized and extraction is accomplished according to the rules which govern version, the details of which are found in the portion of this work dealing with the surgery of obstetrics.

Other methods of reposition of the cord, such as the sewing of the gelatinous coating to a soft catheter and the carrying up of the catheter with the attached cord toward the fundus out of the reach of pressure, are not apt to be successful, aside from the fact that the extra manipulations entailed may infect the woman, no matter how careful our technique.

Presentation of the pelvic extremity, with the legs extended along the ventral surface of the fœtus, offers special difficulties, particularly in the final stage of expulsion. The same management of the stage of dilatation and of descent and rotation is indicated, but, when the presenting part has undergone this mechanism, unless the fœtus be relatively small in comparison with the capacity of the pelvic outlet, it will be necessary to decompose the wedge; that is to say, to bring down one or both feet before delivery can be effected. It is at once apparent how difficult this is where the pelvic extremity is wedged in the pelvis and the walls of the uterus are closely applied to the body of the fœtus. In order to reach the feet or even the knee it is necessary to secure uterine relaxation so that the hand may reach the fundus of the uterus in order to grasp a foot or the knee. Even if this can be accomplished, the task of flexing the leg on the thigh and then of bringing the leg down into the vagina is difficult. Surgical anæsthesia will be necessary in order to secure the requisite relaxation of the uterus, and, if the manipulation is successful, delivery should be terminated whilst the woman is anæsthetized.

Where this manipulation fails, and it ordinarily will if the breech is deeply engaged, there are a number of manœuvres at our disposal.

Where the groin of the fœtus is accessible we may be able to pass a sterilized gum-elastic catheter around, thread the eye with a stout sterilized cord, and make downward traction in the axis of the pelvic outlet. This manipulation will, of necessity, be around the anterior groin, since the posterior will be inaccessible, and the anterior must descend first and become fixed under the pubic arch in order to allow the posterior to sweep over the posterior wall of the pelvis. The string, or so-called fillet, is always to be preferred to the blunt hook which is still described in works on obstetrics, since this hook is very apt to injure the fœtus and, if it should slip, will damage seriously the maternal parts. If the groin is accessible and the fœtus and the pelvis are normally proportionate, then, frequently, the breech may be brought down by inserting the finger of one or the other hand into the groin, and, grasping the wrist of this hand by the other, downward traction in the axis of the pelvic outlet may suffice to bring the breech down. Should these manipulations fail, then the only resource is the forceps to the breech, applied as is indicated in "Obstetric Surgery."

During traction incidental to all these manipulations it is necessary that the uterus should be followed down well, otherwise the arms will extend over the head or the chin will extend, thus complicating the delivery of the after-coming head.

Of course, if extension of the legs along the ventral surface of the fœtus is diagnosticated before engagement, the proper course to pursue is to insert the hand and to bring down a foot whilst the manipulation is comparatively easy. This subjects the fœtus to risk, however, since then the cord may prolapse, but it is a question simply of choice between two evils, and the lesser consists in the manipulation just described.

In case of presentation of the pelvic extremity, when the trunk of the fœtus has been delivered, if the arms have been allowed to extend above the head, these must be delivered before the head can be extracted. The difficulties are great, and the life of the fœtus is very much compromised. It is necessary to insert the hand practically to the fundus and, by a mechanism of flexion, bring down first one arm and then the other. The umbilical cord, if not already subject to pressure, will certainly be during these manipulations, and there is, further, considerable risk of the uterine rupture should the lower uterine segment be thinned out. Where the fœtal pulse-beat in the cord has ceased it is useless to subject the woman to the accompanying risks of extraction of the fœtus, but perforation of the after-coming head had better be immediately resorted to. Occasionally, after delivery of the trunk, the lower uterine segment closes down on the neck of the fœtus, and then delivery of a living child is impracticable, unless the attendant instantly incises the cervix in order to release the neck. This procedure is one of great risk to the woman. It is difficult to make the requisite incisions, since the trunk of the fœtus is in the way of the necessary manipulations; and, again, owing to the fact that the muscular fibres are closely applied to the fœtal neck, it is a difficult matter to insert the scissors. The incisions, further, cannot be limited as we would desire. In case they extend into the lower uterine segment they may involve the broad ligament and give rise to extensive hæmorrhage into the subperitoneal tissue. In view of these facts, in case, under deep surgical anæsthesia, the spasm does not yield, it is wise to elect perforation of the after-coming head.

As was noted to be the case in presentations of the vertex, we may meet with what are termed deviated presentations of the breech. In such cases the sacrum or the hip offers at the superior strait, when, unless the position be rectified manually, the fœtus cannot engage and descend. As a rule, the necessary rectification will entail the insertion of the hand and the bringing down of a foot, when labor is completed, as is the case in a primary presentation of the foot.

PRESENTATIONS OF THE TRUNK.

We have seen that, through spontaneous evolution, a transverse presentation may be delivered under the natural mechanism. Such an event, however, should never be anticipated. As soon as recognized, a transverse presentation should be converted into a presentation of the pelvic or of the cephalic pole. Before labor external version will accomplish this, although the vicious presentation is very likely to recur. If the transformation into a vertex presentation is accomplished before the onset of labor, a firm bandage should be applied with pads at opposed sides of the abdomen above and below, the object being to prevent the breech from descending and the vertex from rising. Notwithstanding these precautionary measures, the transverse presentation may recur, and then, in addition to the pads, it may be necessary to keep the woman in bed, lying as much as possible on the side opposed to the breech.

If the presentation of the trunk be not recognized until labor has set in, then precautions should be taken to keep the membranes intact until the cervix is dilated or is dilatable, when, under anæsthesia, podalic version should be resorted to. Where the presentation is not recognized until after rupture of the membranes, then, if the shoulder has not engaged deeply, it may still be possible, under the relaxation secured through the administration of ether, to push up the shoulder and to bring down the foot; but, if the uterus is firmly contracted around the body of the fœtus and the engagement is deep, then, instead of endeavoring to perform a forced version with the accompanying risk of rupture of the uterus, decapitation should be elected, unless the woman, in full view of the greater risk to herself, should elect the Cæsarean section. This major operation will be always contra-indicated, however, if the mother's condition be not good or if there is evidence of exhaustion of the fœtus.

In the rare instances where spontaneous evolution occurs the duty of the physician is purely passive, watching the woman for evidences of exhaustion. Exceptionally, even after impaction of the shoulder, it may be possible to cause spontaneous version to occur. This will only be the case, however, where the fœtus is small in comparison with the pelvis, or the reverse. Then, by replacing the prolapsed arm and by pressing on the shoulder, *sometimes* the one or the other pole of the fœtus will present instead, and the labor is terminated by nature or by art, according to the condition of the maternal vital forces.

MULTIPLE PREGNANCIES.

Although a woman may deliver herself of two or more fœtuses without the intervention of the physician, still, since the course of labor is apt to be complicated at one or another stage, it seems wise to discuss the subject of multiple pregnancy in this chapter.

Three reasons are offered for the occurrence of multiple pregnancy: either two Graafian follicles are fecundated at the same time and develop concomitantly, with the result that two fœtuses are delivered; or a single follicle contains two ova which are fecundated at the same time; or a single follicle contains two nuclei.

An outcome of these possibilities is the fact that two ova shed at the same time may be fecundated at different periods by the same or by different persons, giving rise to what is termed superfecundation; or, again, two ova shed at different times are fecundated at intervals more or less prolonged. This latter occurrence is termed superfœtation. Superfecundation has been proved possible by the delivery of women at term of fœtuses of different color, the result of the women having sexual commerce with a white man and a negro at periods not far removed. Superfœtation, on the other hand, is not so easy of explanation. This occurrence necessitates that after the first fœtus has attained a certain degree of development a second ovum becomes fecundated and finds lodgment in the uterus. It is very difficult to believe that the male sexual elements can gain access to an ovum when the cavity of the uterus is occupied by another impregnated a number of weeks previously. It must be remembered, however, that up to the third month of gestation the two deciduæ are not opposed so as to forbid access of the spermatozoa to the uterine cavity; and it must be still further borne in mind that ovulation possibly continues throughout gestation, even as it does throughout lactation, when, similarly, what is considered the outward manifestation of the process—menstruation—is absent. Therefore, the possibility of superfœtation cannot be denied, although we are justified in being very skeptical in reference thereto. The result of the manner in which the ova are shed gives a different arrangement of the twins in the uterus, and with this we are chiefly concerned.

Where the two ova which are shed come from separate Graafian follicles, each has its own membranes, and, therefore, there are two separate amnions and two chorions. There are also two placentæ, although the separation between the two may only be determined on careful examination, the partition between them being membranous and the apposition of the two being close.

Where the fœtuses are formed from the fecundation of two ova in a single Graafian follicle, we still find two amnions, but only a single chorion. The placentæ are separate, but there is close union between the two and free anastomosis of the vessels.

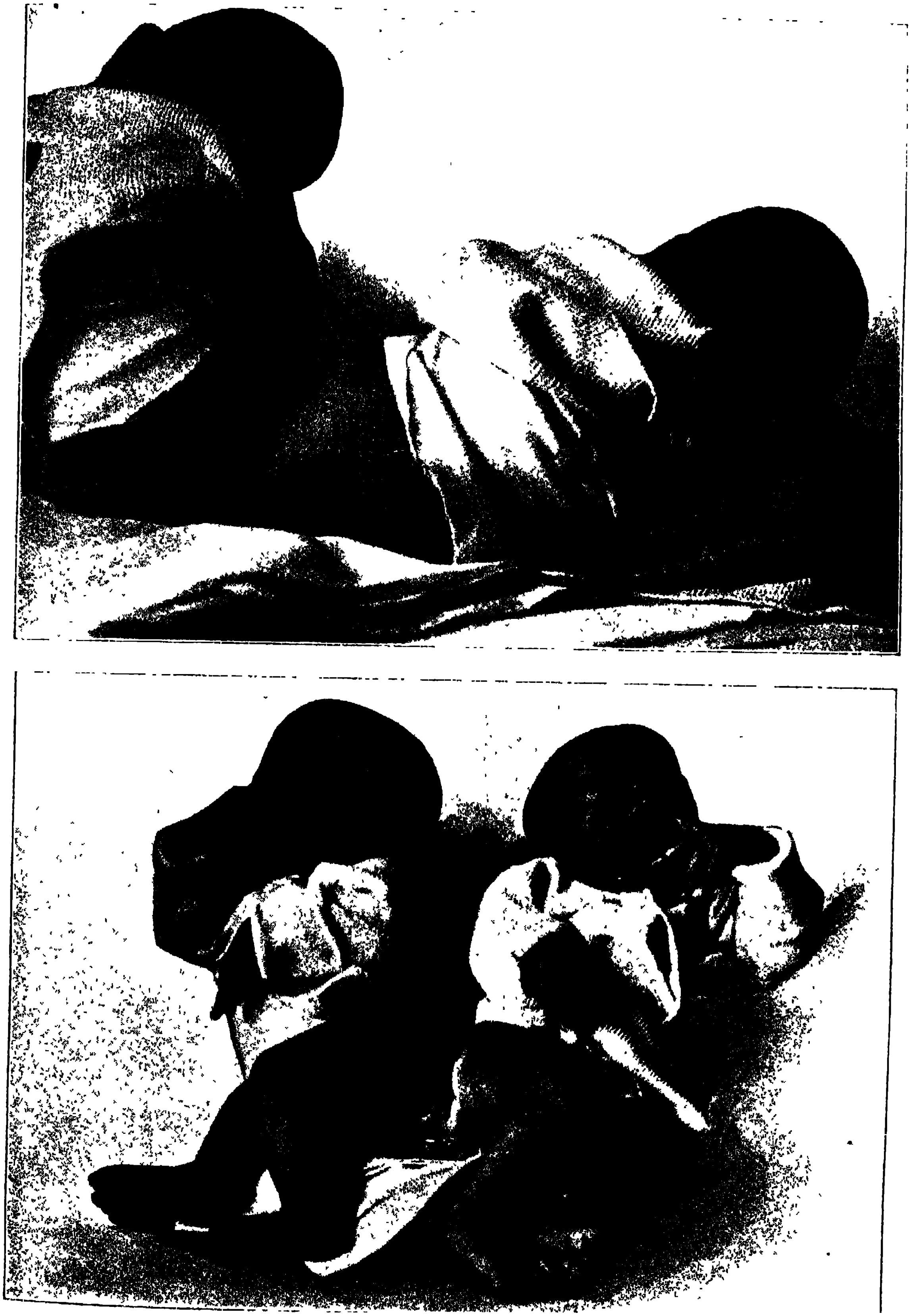
If the twins result from the fecundation of one ovum containing two centres of development, then we find a single amnion and chorion and placenta, the twins floating in the same sac and having a similar blood-circulation.

On the arrangement of the fœtuses, according to the fashion after which they have developed, depends many of the difficulties which are offered in the delivery of twin gestations. Thus, it is at once apparent that where the fœtuses occupy separate sacs the birth of one is not as apt to be interfered with by the other as where they occupy the same sac.

Usually the combined weight of the fœtuses exceeds that of a single fœtus, but not uncommonly one fœtus seems to be developed at the expense of the other, leading to the suggestion of immaturity. At times, one fœtus dies during gestation, either from lack of proper blood-supply, or, what really amounts to the same thing, through compression exercised by one fœtus on the other. Where the fœtuses occupy a common sac the cord of one may become entangled around the neck of the other, the result being that through tightening of the cord this fœtus is killed. At times, in twin pregnancy, one fœtus is born perfect in development whilst the other is imperfect, possibly to such a degree as to constitute a monstrosity. Again, where the fœtuses occupy a single sac fusion may occur at one or another part, giving rise to a species of monstrosity known as joined twins. The junction may be at the head, or sternum, or back, or at the pelvis, an interesting example of the latter which we have seen being figured in Plate XXXI. Again, one fœtus may be included in the other,—so-called cases of fœtal inclusion. Details in reference to these cases of monstrosity will be found in works devoted to the subject.

The diagnosis of multiple pregnancy is by no means a simple matter; indeed, in the average case only a presumptive diagnosis may be reached. The excessive size of the abdomen, where this is

PLATE XXXI.



Pygopagus (Tynberg).

a factor, may be present in cases where there is simply an excess of liquor amnii. In case hydramnion complicates twin gestation, the diagnosis is concomitantly more difficult, owing to the greater difficutly of making abdominal palpation. Where, on auscultation, two fœtal hearts are heard beating with separate rhythm and with maximum intensity at different parts of the abdomen, particularly when such data are established by separate observers, then there is a reasonably strong presumption of multiple gestation. If, in addition, on palpation two heads are felt or two pelvic extremities, then this presumption is strengthened.

As a rule, in cases of twin gestation, the tension of the abdominal walls is greater, owing to the greater distension of the uterus. This, however, is purely a relative phenomenon, since the same condition accompanies cases of hydramnion. Late in pregnancy we are apt to find suprapubic œdema and also a transverse depression just above the pubes. The same signs, however, may, again, accompany instances of excessive amount of liquor amnii. Where, on vaginal examination, the head is found presenting and yet at the upper uterine segment a head is felt, or if a second head is determined in one or the other lateral uterine walls, then the diagnosis of twin gestation is certified. As a rule, however, the only positive sign of value is the hearing of two fœtal hearts differing in rhythm and in location of maximum intensity.

Labor in case of multiple gestation is apt to be prolonged, since the woman has to undergo the process twice, as it were. The third stage is apt to be complicated by hæmorrhage, since, owing to the excessive uterine distension, uterine atony is a common sequence. The labor itself will rarely offer difficulties unless one fœtus interferes with the execution, by the other, of the requisite mechanism. The fœtuses may present in any possible way. Thus, they may both offer by the heads or the pelvic extremities, or one may present by the breech and the other by the head, or one may offer by the head or the pelvic extremity and the other be transverse. Where the fœtuses occupy separate sacs interference is less likely than when they lie in a single sac. After one fœtus has been delivered there occurs a pause and then the uterine contractions start in again, the second amniotic sac ruptures and the second fœtus is born. It must never be forgotten that even though there exist two placentæ the anastomosis between the two may be partial or complete, and that, therefore, if on the delivery of one fœtus the cord be not tied toward the maternal as well as toward the fœtal surface hæmorrhage will kill the second fœtus. Where after the delivery of one fœtus there is sign of impending maternal exhaustion we should not await the onset of the second labor, but, dilatation having been effected, the twin should be delivered by forceps or by version, according to the degree of engagement, and after the manner laid down in the portion of this work dealing with the surgery of obstetrics. We should always bear in mind the danger of uterine atony and consequent hæmorrhage and be prepared to tampon the uterine cavity in case the milder means for causing uterine contraction do not speedily suffice.

Where the fœtuses occupy a common sac one twin may descend by the head or the breech and occupy the pelvic inlet with the first fœtus. This is alone possible, of course, where the pelvic inlet is excessively large compared with the bulk of the fœtuses, or the reverse. In such an event we have an impaction, and, in order to effect delivery, it may be necessary to sacrifice one or the other fœtus in order to give the other an opportunity to be born alive. Where the head of the second fœtus engages in advance of that of the first we have a complication known as locked twins, and here, in order to deliver at all, it becomes necessary to decapitate one before the other can be delivered.

Transverse presentations are not uncommonly met with in case of multiple gestation, a point to be remembered, because, on the birth of the first fœtus, if the other occupy the transverse diameter immediate delivery by version is called for before we obtain an impacted shoulder. The occurrence of spontaneous version or evolution should never be awaited.

The statements we have made in reference to twin gestation apply with equal force to instances of triplets, or quadruplets, etc.

Triplets occur about once in eight thousand deliveries; quadruplets and quintuplets are of excessive rarity, although a number of authentic cases have been recorded. Obviously, the difficulties which delivery may offer are intensified by the number of fœtuses present. If the physician will only bear in mind the fact that it may become necessary to interfere in the interest of the fœtuses or of the woman, and that the danger of hæmorrhage from atony of the uterus is greater than in case of single gestation, he will be ready to meet the exigencies of the individual case as they offer.

INVERSION OF THE UTERUS.

An occurrence which renders labor abnormal, and which remains to be referred to, is inversion of the uterus, and this constitutes a most serious complication. The causes, in general, are atony of the organ associated with irregular contraction at the fundus, or a possible cause is attempt to deliver the placenta by traction on the cord. This factor will hardly be efficient unless there is associated atony, with the tendency to contraction of the upper uterine segment. As a rule, traction on the cord if the placenta does not appear will result in rupture of the cord.

Inversion of the uterus may be partial or complete. One or another horn may appear or the entire organ may turn inside out and emerge at the vulva. The uterus being atonic, the blood is pouring out of the uterine sinuses and the condition of the woman may become most critical. Reposition may be most easy and again most difficult. Where difficulty arises it is due to the fact that the inverted lower uterine segment, which now lies above, contracts down and offers a barrier to reposition. If the inversion can be promptly rectified by pushing up one horn and then the other, and finally the centre of the uterus, it must be remembered that the tendency to recurrence is very great, and, therefore, the physician should remain by his patient until, through the administration of ergot and of strychnia, he is satisfied that the organ has regained tone and will remain contracted. In case spasm of the lower uterine segment occurs, preventing reposition, then, under ether anæsthesia, the spasm may yield and reposition be possible. If this fail we would advise a waiting policy unless the woman is losing much blood, since the spasm may yield after an interval. In case the hæmorrhage is free the attempt may be made to check it by the firm tamponade with sterile gauze held in place by a bandage, bringing to bear compression, as it were, although under the given conditions this will prove very difficult. Should this attempt fail, before the woman becomes exsanguinated the sole resource—desperate as it is—is to open the abdomen and stretch the contraction ring. It has become a choice between two evils,—allowing the woman to bleed to death and subjecting her to the risk of sloughing of the imprisoned portion of the uterus, or resorting to the major operation for the release of the spasm. The manipulation which this complication requires must be characterized by the most absolute asepsis, else the woman will be infected.

Washing the Eyes of the Fœtus Immediately After Delivery

CHAPTER VIII.

CARE OF THE NEWBORN INFANT.

THE fœtus having been separated from its mother through ligation of the umbilical cord, the first care requisite is attention to the eyes. Even before the cord is tied, where the exigencies of the individual case do not call for immediate ligation, the eyes should be washed. The average fœtus comes into the world with its eyes coated with the vernix caseosa, and, although in a case where the woman is free from infectious taint this cannot affect the eyes injuriously, seeing that in no given case are we in a position to certify that our technique has been absolutely aseptic, care in the early cleansing of the eyes is called for. (Plate XXXII.) The vast proportion of cases of ophthalmia may be traced to infection whilst the child is emerging from the genital canal, or even whilst it is in the canal, since, once the membranes ruptured, the eyes may readily come in contact with infectious material. The method of caring for the eyes will vary according as we are satisfied or not that the woman is free from specific taint. If she give no history of precedent vaginal discharge or if she is in that walk of life where gonorrhœal virus is not so apt to exist,—although such inference is never safe, since, whilst we may feel quite sure of the woman we can never have the same degree of confidence in the purity of the male,—then the following procedure is ample. With aseptic hands the physician or the nurse wipes off the eyelids with a piece of sterile gauze or cotton soaked in a saturated solution of boric acid, and, this accomplished, the eyelids are opened by the thumb and index of one hand, whilst the conjunctival surface is carefully cleansed by irrigation with the same solution. If the palpebral surface of the lids is covered with the vernix caseosa, then the physician should evert the lids and wash this surface off. We lay stress on the careful asepsis which should be associated with this manipulation, because eyes otherwise not infected may become so if our technique is at fault, and this may mean irreparable damage. The same care should be associated with the washing of the eyes thereafter, although, unless symptoms develop, it is not necessary afterward to do more than wash carefully the external surface of the eyelids. Since these principles have been introduced into obstetrics it has become exceptional to meet with cases of even mild ophthalmia.

In the event of there being a suspicion of gonorrhœal infection, it is not sufficient to use boric acid. Opposed, as we are, to the routine adoption of Credé's method of instillation of silver-nitrate solution, we are firmly convinced that its adoption in every suspicious case has been the cause of the infrequent occurrence of aggravated ophthalmia with its awful sequelæ. We look upon it as little short of barbarous to instill the silver solution unnecessarily into the eyes, whilst we realize to the full the great value of the method in aborting a possible virulent ophthalmia or in modifying its course.

Where there is a suspicion of possible infection, the eyes are first carefully washed with boric-acid solution, and then the eyelids are everted by the physician,—for the nurse, unless specifically trained, is not competent,—and 2 drops of a 2-per-cent. solution of nitrate of silver is instilled, care being taken that the solution comes in contact with the conjunctival surface of the eyelids as well as of the eyeball. Too much stress cannot be laid on this point. If this precaution be neglected, then our technique is imperfect and ophthalmia may develop. The *rationale* of the method depends on the determined ability of silver nitrate of killing the infectious elements,—the gonococci of Neisser. After a minute or two the excess of nitrate of silver is washed off and neutralized by instilling a solution of sterile 2-per-cent. salt. As a result of this instillation of the nitrate of silver a traumatic inflammation is induced, which leads to congestion of the conjunctiva and more or less swelling of the eyelids, but these symptoms should abate in the course of twenty-four hours, and it is unnecessary to repeat the process

Where the eyes have not been carefully washed or where they become infected notwithstanding the care taken, then we have to face an ophthalmia which will run a mild or a severe course, according to the degree of infection and also according to the measures resorted to for treatment. In case of the development of an ophthalmia, the severest oversight is necessary to avoid the complications, —ulceration, perforation, and permanent blindness.

If, in the course of twenty-four to thirty-six hours after delivery, the eyes, or one alone, begin to secrete a muco-purulent matter, then the instillation of nitrate of silver should be repeated, and, as soon as there appears chemosis or swelling, ice-pads should be kept over the eyes constantly. A convenient method of doing this is to place a number of thin pledgets of absorbent cotton on a block of ice and to instruct the nurse to apply them over the eyes frequently. In case only one eye is affected, great care is requisite to avoid infection of the other. The nurse should never touch the other eye without first carefully sterilizing her hands, and all cloths or cotton used for the infected eye should at once be destroyed, to avoid the possibility of their being used for the non-infected eye. When the physician lives in a city where he can obtain the services of an ophthalmologist, it will be wise to turn the infant over to his care. In remote country-districts, however, this will not be possible, and the points to be borne in mind are those on which we have laid stress, and, further, that, as soon as the swelling of the eyes begins to disappear, the time has come to discontinue the use of the ice. It is not possible to lay down definite rules for the frequency with which silver nitrate should be instilled, since there is difference of opinion among the expert. Our impression is that, after thirty-six hours, repetition of the silver solution is uncalled for, except where microscopical examination of the secretions shows that the gonococci are still present. As long as they exist the silver solution is indicated, and no longer. As soon as it is possible to dispense with the silver solution, either a saturated solution of boric acid should be used or else a sterilized 2-per-cent. solution of common salt.

During the few days following the birth of the child the most rigid precautions as to cleanliness of the eyes should be enforced, since, at this time, they are unable to resist infection as they are, to a better degree, later, and on these precautions the sight of the infant depends.

The eyes having been attended to, the next step is to bathe the child. From the start the infant should be accustomed to its altered surroundings, and the greatest of all mistakes is to coddle it. As it is started so it is apt to progress through life. It can best resist the effect of changes in temperature if it become accustomed to such changes. The infant who is looked upon even as a fragile china doll would be, will not grow up with the sturdy constitution and the resisting power which is so essential to healthy manhood and womanhood. The bath of the infant, therefore, should approximate in temperature that of its external surroundings. What should be aimed at is the avoidance of chill. The temperature of the bath, therefore, should be only slightly in excess of that of the room in which it is bathed. As a rule, a temperature of 80° to 90° F. should be selected, except in the case of immature infants, when, since we are not dealing with an individual of normal capacity, we must make the circumstances meet the case. The first step is to remove the coating of vernix caseosa and of blood with which the infant is covered to a greater or less degree. This is accomplished by greasing its surface with some unctuous material, such as sweet-oil or vaselin, the precaution being taken not to allow any of the material to get into the eyes or the stump of the cord, since it is not sterile. This greasing accomplished, the infant is supported on the hands of the nurse and placed in the bath so that the entire surface is covered with the exception of the head. It is then soaped and washed until the surface of the body has been cleansed, when it is removed from the bath and thoroughly dried. The flexures of the body are then covered with vaselin or a pure rice- or bismuth-powder, to avoid chafing of the delicate integument, and next the body is examined for defects. The natural openings are investigated in turn and the toes and the fingers are counted, since one of

PLATE XXXIII.

The Dressing of the Umbilical Cord

the first questions of the anxious relatives will be as to whether the child is perfect or not. If any imperfections are determined it is wise not to tell the mother, since the nervous anxiety she would be subject to would complicate her convalescence; but the father or some relative should be told, and, in case of such a complication as imperforate anus or urethra, steps requisite for giving speedy surgical aid should be taken.

The cord should now be dressed. (Plate XXXIII.) This matter is usually left to the nurse, but it falls within the province of the physician, since infection at the site of the umbilicus is a frequent cause of sepsis of the newborn. We are dealing with a wounded surface and the attention requisite is similar to that which any wounded surface demands; that is to say, asepsis is a *sine quâ non.* A pledget of sterile absorbent cotton or of gauze is wound around the cord, and this is left in place until the cord drops, varying from the seventh to the tenth day. During this interval the child should not receive a full bath, since our aim is to have the cord undergo dry gangrene after an aseptic fashion, and this is interfered with if the dressed cord is wetted, aside from the danger of infection with each manipulation.

If the cord has been properly tied there is little danger of secondary hæmorrhage except in case of hæmophilia; still it is a wise precaution for the physician to investigate the dressing at his first visit after delivery, in order to satisfy himself that there has been no bleeding. In the event of hæmorrhage if the first ligature has been applied as it should be, at a sufficient distance from the body of the child to admit of the application of a second ligature, it may prove an easy matter to arrest the hæmorrhage; otherwise, without trusting to the possible action of astringents, transfixion of the base of the umbilicus should be resorted to. In this connection we would note that a most valuable hæmostatic for oozing from the cord is offered by antipyrin applied in powdered form. Possibly any of the coal-tar derivatives will answer as well.

After the cord has separated it should still be treated as a wounded surface would be; that is to say, according to aseptic principles. It should be kept dusted with bismuth-powder and a firm pad applied over it until cicatrization has become firm, in order to avoid the possibility of umbilical hernia.

The child should now be dressed. All that we, as physicians, can do is to suggest forcibly the desirability of the infant not being clothed too warmly. Excessive weight should be avoided, and yet the infant should be sufficiently clothed to avoid chill. The nurse should be instructed never to cover the head of the infant, all that is really needed being to see that it does not lie in a current of air.

After the woman has rested for an interval after delivery, it is advisable to apply the child to the breasts for the triple purpose of accustoming the nipples to lactation; of giving the child the colostrum in the breast, which is nature's castor-oil, so to speak; and, finally, for the purpose of obtaining the reflex effect of irritation of the mammary glands on the uterus, which conserves the desired firm contractions of that organ.

Before applying the child to the breast, and this rule holds for every nursing, the mouth should be washed out with a saturated boric-acid solution, and the nipples should be similarly treated before and after nursing. These precautions are essential in order to avoid infection of the nipple, which is the cause of abscess of the mammary gland.

During the first few days of the infant's life it requires, besides the colostrum which it obtains from the mother's breast, only an abundant supply of water. This infant has come from the uterus, where it knew nothing about catnip-tea and sugar and milk and water; it enters the world with its intestinal canal filled with the liquor amnii and possibly meconium, and before its stomach is ready to assimilate food these waste products must be eliminated. The colostrum does this, and on or about the third day, when, as a rule, the milk appears in the breasts, the infant is prepared to receive it and to assimilate it. At intervals of about four to five hours prior to the advent of the milk the child should be applied to the breasts, the nipples thus becoming accustomed to traction and the child to receiving its supply of colostrum. On the appearance of the milk the average infant should be put to the breasts at intervals of two to two and one-half hours, and this routine should be the rule up to the third month, when the intervals between the nursings should be lengthened to three hours. It is impossible to rear every baby according to a fixed routine, since the gastric capacity and the functional activity of one necessarily differs from that of another. It has been proven that the rules we have laid down as to frequency of nursing are applicable to the average infant, and, according as they are followed or not, so will the child start in life with good or bad digestive tract. Overfeeding is as bad as underfeeding. Each child must be judged by itself, and it will require a week or two to find out just what the individual infant needs and can digest. During the intervals between the nursings the child should be given boiled, cooled water to drink, and then, if it be healthy and not chafed and the mother affords it a sufficiency of milk, both in quantity and quality, the early days of the infant are spent in sleeping and in feeding.

An infant can be trained from the start even as can a puppy. If it be accustomed to being rocked and walked the floor with and overfed, so must the parents continue or else have a struggle for the mastery. If from the start regularity of habit be followed, then the nursing mother will secure needed rest at night and the healthy infant will remain so. For the first few months of its existence it will be nursed about seven to nine times in the twenty-four hours, at intervals of two to two and one-half hours during the day and at from four- to five- hour intervals during the night. The child should be weighed every ten days to a fortnight, and so long as it is gaining in weight it is thriving, even though it occasionally suffers from colic or has, at times, stools of a green or slimy character. Frequent feeding or, rather, overfeeding will be found to be at the bottom of green stools or colic, where the maternal milk is of proper quality, and the administration of a teaspoonful of lime-water, for a few doses, before the application of the child to the breast will correct the hyperacidity of the stools and the fermentation, or else an enema of soap-suds and warm water will do so by clearing the undigested milk from the intestinal canal. These milder measures should always be tested before resort to the administration of drugs. The more common sense is utilized in the rearing of the infant, the less will it be requisite to resort to drugs.

Regularity in nursing, sleep, bathing, and a sufficiency of fresh air and water are the keystones which lead to the development of the healthy child.

Thus far we have traced the care which should be given to the infant born at term and in sound condition.

Premature infants demand special attention. The child born at the thirty-fourth to the thirty-sixth week does not as readily accommodate itself to its surroundings. Its organs are not developed to the requisite degree, and we must lend it artificial aid. Thus, it must be clothed more warmly, and this is accomplished by wrapping it in cotton and surrrounding it with hot-water bottles, or, in case of prematurity to the extent of six weeks before term, it should be placed in an incubator such as is described in the surgical portion of this work. If such an apparatus be not obtainable one may readily be improvised. Often the premature infant has not the power to exert sufficient suction to empty its mother's breast, and if we do not come to its aid it drifts rapidly into a condition of inanition. Obviously, as the maternal milk is the best food for the infant at term, it becomes all the more so where the child is immature. The woman's breasts should, therefore, be milked out by hand and the child fed with it by means of an ordinary medicine-dropper. Absolute cleanliness should characterize this process, in order that the milk should reach the infant in as sterile a condition as it exudes from the breasts. The immature infant, further, requires feeding at more frequent intervals than does the mature, since, its gastric capacity and function being less, it cannot obtain the requisite amount of nourishment in the same interval of time as can the mature child. Possibly we can supplement the food of such an infant by having its body anointed a number of times a day with sweet- or codliver- oil.

As far as the infant is concerned, the great emergency which offers is *asphyxia.* We distinguish two types,—the anæmic form of asphyxia and the congestive or apoplectic form.

The causes of asphyxia, in general, are dependent on conditions of the woman and on the placenta or the cord. The anæmic form results from insufficient nourishment dependent on disease of the placenta or on compression or twist in the cord. Thus, the anæmic type results from the fact that the infant either receives a deficient supply of oxygenated blood or else the condition of the woman is such that she is unable to give the infant the oxygen which it needs. Antepartum hæmorrhage, for instance, associated usually with placenta prævia, is one cause of the anæmic type of asphyxia, for the reason that the woman loses so much blood that what she furnishes the fœtus is of poor quality. Disease of the placenta interferes with the infant receiving the oxygen which it needs, seing that the circulation through this organ is impeded. Obviously, where the cord is twisted or compressed the fœtus suffers from lack of blood.

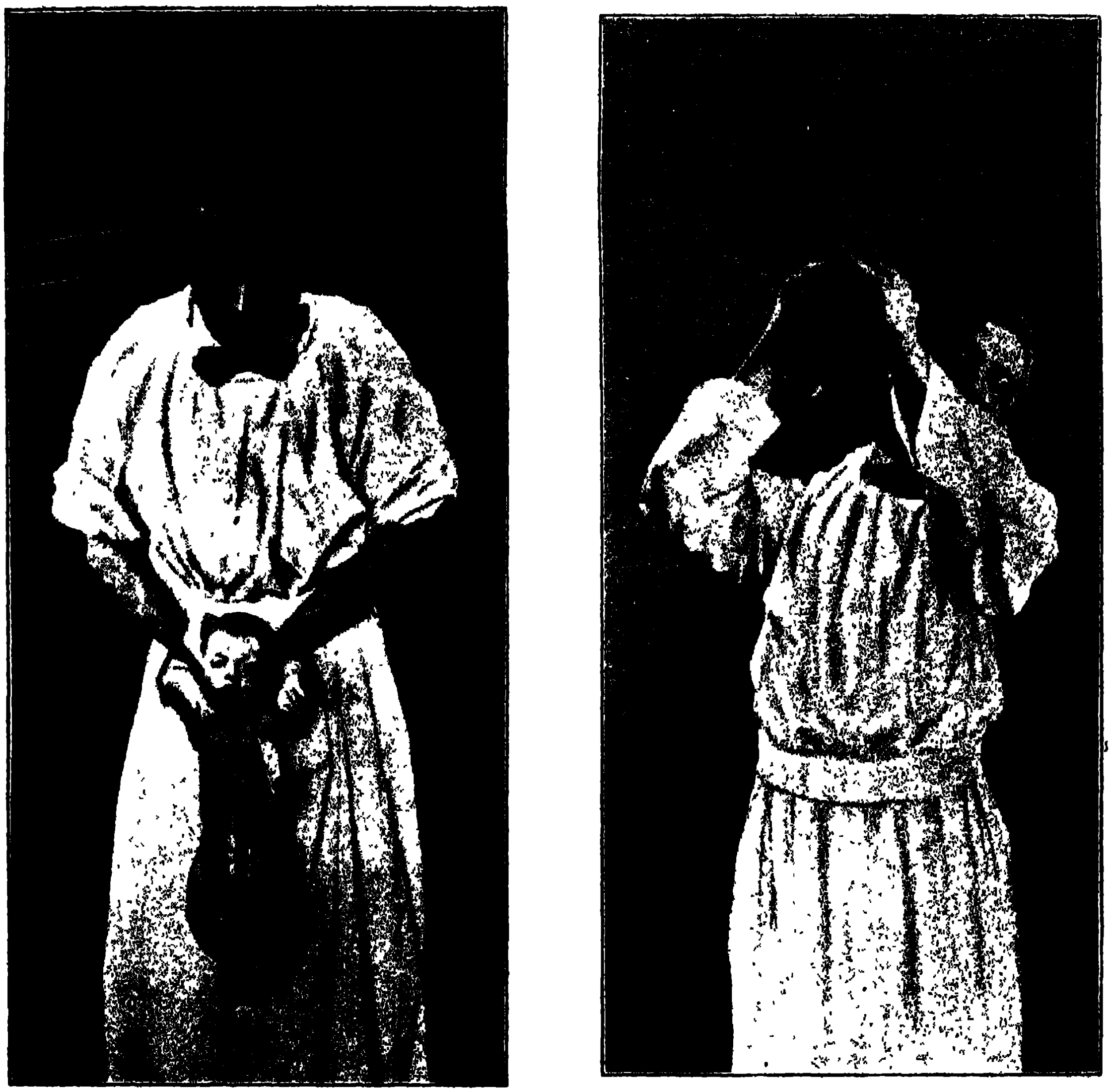
The apoplectic form of asphyxia, on the other hand, usually follows protracted labor or conditions which have resulted in spasm, to a greater or less degree, of the uterus during the second stage. In this form the fœtus receives a sufficient supply of blood, but it is again improperly oxygenated, becomes venous in quality, and there results congestion.

In the anæmic form the infant is born pale and limp, the surface being cold and the muscular system flaccid. The sphincters are relaxed; the heart-beats are faint and rapid or imperceptible. The pulsation in the cord is similarly faint or imperceptible. Respiration is absent altogether or gasping at long intervals. The picture is one of acute shock from loss of blood. In the apoplectic form, on the other hand, the surface is congested; the muscular system approaches rigidity; the pulsations of the heart are slow and labored; it may be possible to excite reflex movements in the fœtus; respiration is slow and labored.

Either of these types of asphyxia may be so profound as to simulate death, and yet, in every case, the methods of resuscitation should be faithfully tested, since there are many cases on record where, through perseverance, even a forlorn hope has resulted in a victory. Where the diagnosis of the form of asphyxia is made prior to the cutting of the cord, it is advisable not to tie in the anæmic form so long as it is possible for the woman to furnish the infant with blood; that is to say, tying should be delayed for a number of minutes. In the apoplectic form, on the other hand, it is wise to allow the cord to bleed, thus in a measure relieving local congestion. During these procedures the mouth and nose and pharyngeal vault should be cleared of mucus and liquor amnii by inserting the finger, covered by a piece of muslin, into the mouth and a cotton-wrapped probe into the nostrils. If there is valid ground for thinking that much liquor amnii and vaginal mucus has entered the trachea, then a catheter should be passed into the trachea and suction be exerted. As a rule, however, this will not be requisite, since either of the methods of artificial respiration we shall shortly describe causes the expulsion of detritus from the trachea and upper bronchi.

The mouth and the nostrils having been cleansed, a piece of muslin should be applied over the infant's mouth, and, whilst its nostrils are being compressed, the physician should apply his mouth over the child's and slowly breathe into it, then depress the infant's thorax and again breathe in. This mouth-to-mouth insufflation we much prefer to attempts at insufflation by means of the catheter, and often, if persisted in, we shall be able to resuscitate the infant in this way alone, especially if we are dealing with the apoplectic type. If the type is anæmic, then we question if over-anxiety and resort to active measures do not kill many an infant. As we have stated, the anæmic infant is suffering from shock, and the measures which suggest themselves are similar to those we would resort to were we dealing with an adult. Heat to the surface, the injection into the rectum of a pint of hot (115° F.) saline (2 per cent.) solution, the instillation into the mouth of 10 drops or so of brandy,—such are the primary measures of utility. If we seize such an infant and plunge it into hot water and then apply ice to its surface and

PLATE XXXIV.



Schultze's Method of Artificial Respiration.

then spank it or hold its head down, exposed to the chill of the room, the chances are that we shall not be able to resuscitate it. Calm demeanor and absence of overhaste will do the child more good if the simple measures we have outlined are resorted to.

In case of an apoplectic infant we need not worry so much over attention to bodily warmth or stimulation. What this child needs is resort to measures which are going to cause it to breathe deeply, the result being relief of congestion through proper oxygenation of the blood, and, in consequence, vigorous heart-action, since, concomitantly, the venous engorgement of this organ is relieved. Here then, after cleansing the mouth and the nostrils, it is well to resort to one or another of the methods of artificial respiration.

The two methods of artificial respiration with which the student should familiarize himself are the Schultze and the Byrd, the latter having been of late years resuscitated and advocated by Dew; and we therefore prefer to give it the name of the Byrd-Dew method, since Dew unquestionably independently systematized the method which Harvey Byrd, of Baltimore, described a quarter of a century ago.

Schultze's method is well represented in the accompanying plate (Plate XXXIV). It aims at producing alternate expansion and compression of the thoracic walls, thus imitating nature's respiratory acts. Further, the descent of the diaphragm is favored and the necessary associated compression of the abdominal walls drives the diaphragm upward in the expiratory act, and thus the lungs are alternately expanded and compressed. The child is grasped just below the neck, the fingers resting on the dorsum and the thumbs on the thorax. The first motion is to hold the child downward and then the second motion is to swing the child upward and backward over the head, thus flexing the lower extremities on the abdomen. These alternating movements are repeated at intervals, and may be followed by the restoration of the function of respiration.

Practically, the Byrd-Dew method accomplishes the same effect as the Schultze, but it has the decided advantage that the steps of the method may be followed whilst the surface of the child is kept beneath hot water,—a necessary accompaniment in cases where we are dealing with the anæmic type of asphyxia or where the stimulus of heat to the body is otherwise desirable.

The infant is grasped with the left hand, with the neck resting between the thumb and forefinger, the head falling far over backward, the upper portion of the back and the scapulæ resting in the palm of the hand, the other fingers in the axilla lifting the arm upward and outward, and with the right hand grasping the knees (if the infant is small, the ankles) between the fingers, the thighs resting in the palm of the hand. (Plate XXXV.)

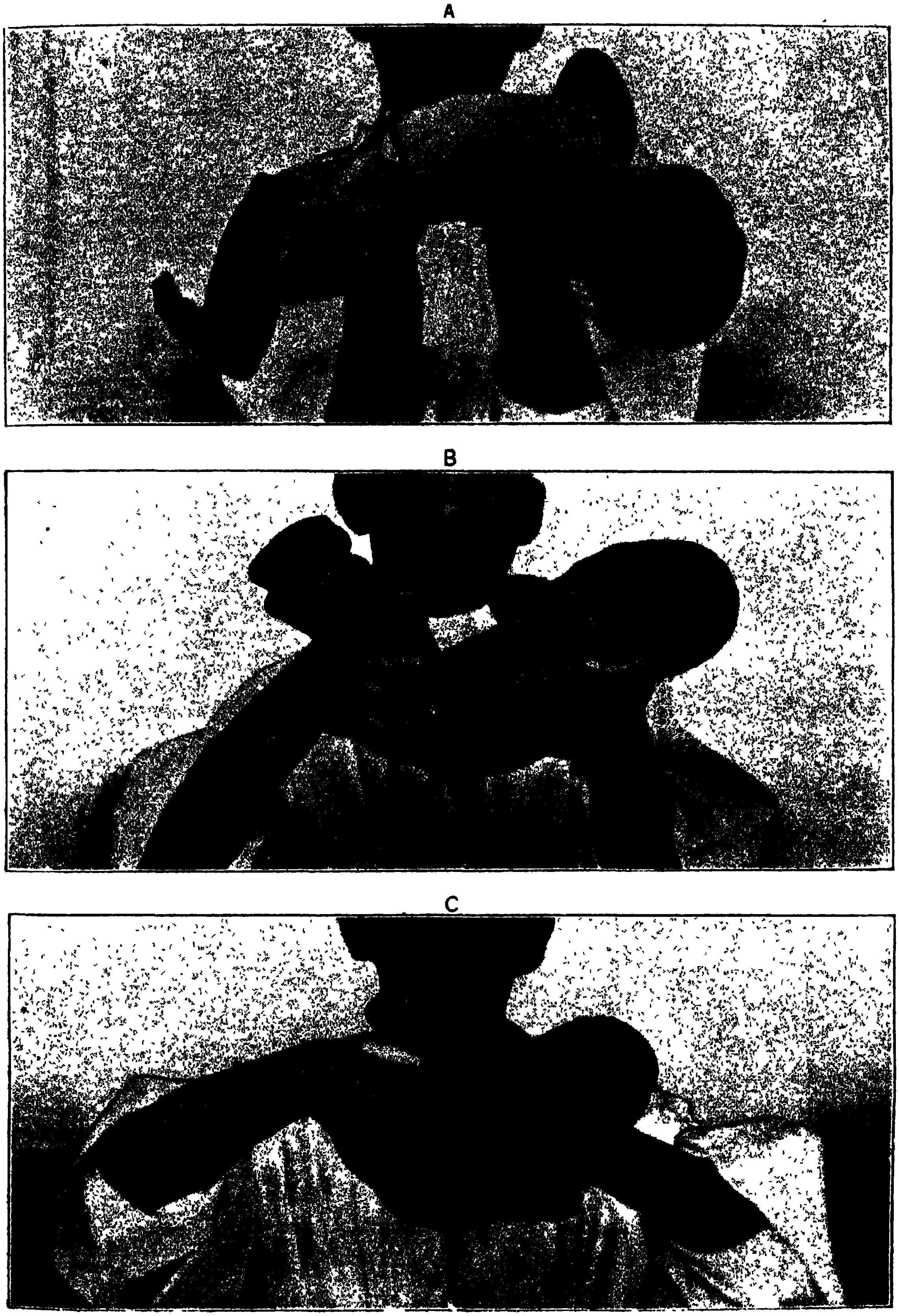
Then to induce inspiration depress the pelvis and lower extremities, allowing the abdominal organs to drag the diaphragm downward; and with the left hand gently flex the dorsum backward. This lifts and separates the ribs like the segments of a fan.

To excite expiration reverse the movement bringing the shoulders and chest forward, closing the ribs upon each other, and at the same moment bring forward the thighs, resting them upon the abdomen. This movement crowds together the contents of the thoracic and abdominal cavities, resulting in a most complete and forcible expiration, while, at the same time, it empties the great blood-vessels of their engorged venous supply and relieves the right heart. In short, not only is the following inspiratory act rendered more decided as a consequence of this perfect expiratory movement, but a distinct suction effect is excited, in a most beneficial way, on the thoracic circulation.

During these manipulations, which may be repeated from six to eight times a minute, the air may be heard entering the trachea during the inspiratory act, and on resorting to the expiratory movement not only is the air driven out, but also any mucus or liquor amnii which may have entered the air-passages.

One or the other of these methods, associated with mouth-to-mouth insufflation, will result in the resuscitation of the majority of infants who are suffering from the effects of the venous form of asphyxia. The methods are tedious, but they should be kept up so

PLATE XXXV.



The Byrd-Dew Method of Artificial Respiration.

A. Extension. B. Semi-flexion. C. Complete Flexion.

long as there is the slightest audible heart-beat. Of the two methods, the Byrd-Dew has answered best in our hands, for the reason that other restorative measures can be resorted to at one and the same time. The ordinary Marshall-Hall or the Sylvester method presents no advantage over those we have described; indeed, in infants, we question if they possess the same advantages that they do in adults.

A further method worthy of trial is the recently resuscitated one of promoting respiration by traction on the tongue. The tongue is grasped by a vulsellum forceps and, at intervals of three to six times to the minute, it is drawn outward and then allowed to return to its natural position in the mouth. This traction is supposed to set up reflex respiratory action, and may be stated as of value as an adjuvant to the Byrd-Dew method.

In case of the anæmic type of asphyxia, when the prognosis is always worse, the Sylvester method, with the infant's body held in a tub of warm water on the hands of the nurse, or else the Byrd-Dew method similarly applied, should be preferred. It must be remembered that, in this form of asphyxia, the surface of the body of the child must be kept warm, in order to enable it to emerge from the condition of acute shock, so to speak, in which it is.

PART III.—The Puerperal State.

THE NORMAL PUERPERIUM.

THE PATHOLOGICAL PUERPERIUM.

CHAPTER IX.

THE NORMAL PUERPERIUM.

The puerperal state can only be physiological where the woman is uninfluenced by other than natural environments. The Indian squaw, in the early history of this country, gave birth to her child without delaying her companions when on the march, and was able at once to join them in their journey. To-day we have to deal with an entirely different being. Woman has inherited from her ancestors a physical organism so far removed from that belonging to the savage that what was once a physiological act, pure and simple, now verges on the pathological. Indeed, it requires the astuteness of the careful physician to recognize deviations from what should be normal and yet what is too frequently pathological.

The puerperium comprises the period beginning with the end of the third stage of labor and terminating when the woman returns to her normal state of health. It is impossible to accurately define the length of time the puerperal state covers, since so many conditions influence this interval. The process of labor involves an enormous amount of muscular energy, loss of blood and strength, and therefore it is followed by exhaustion to a greater or less degree. The frequently necessary exposure of a portion of the body, together with the rapid evaporation of heat from portions which are wetted, results in loss of tone, which is manifested, often, by a sense of chilliness or even by a decided chill. This chill is, however, of no special significance, being unaccompanied by rise of temperature. The pulse, which during the act of labor has become accelerated, slows down and becomes regular, falling as low, frequently, as fifty beats to the minute. This is of good prognostic omen, and the careful physician will always watch his patient when the reverse holds true. Undue acceleration of pulse is an indication of impending hæmorrhage or of exhaustion.

In case the labor has been tedious we may witness, during the twelve hours following delivery, a rise of temperature to 100° F. After this period the temperature should not rise above 99° to 99.5° F. unless there be some complication impending or existing. Before the days of asepsis during labor and the puerperal state the physician rather expected a rise of temperature about the third or the fourth day. Indeed, this occurrence was so constant that it was ascribed to the filling of the breasts, and it received the name of "milk fever." To-day, however, where asepsis is carefully maintained this rise of temperature is not noticed except in instances where the intestinal tract is clogged, and then it is due to absorption of waste products. A laxative reduces the temperature to the normal.

Inability to empty the bladder is a frequent and annoying complication of the early puerperal state. This is often due to the fact that the woman is unable to empty her bladder in the recumbent position. Again, the œdema of the vestibule may partially occlude the calibre of the urethra and offer such an amount of obstruction that the somewhat paralyzed bladder cannot empty itself. The bladder should receive attention at least every eight hours, and where it is necessary to catheterize the nurse should be instructed to do so by sight after precedent asepsis of the vestibule.

Involution of the uterus begins coincidently with the process of labor. The firm contractions of the muscular fibres necessitate waste and at the same time the lessened blood-supply causes fatty degeneration to set in. Coincidently with this fatty degeneration new cells are being formed; that is to say, the degenerative and the regenerative processes go hand in hand. The uterus thus diminishes in size and its walls increase in density. It requires about two months for this process of regeneration to be accomplished, and yet the uterus never returns to the size it had before conception. It always remains larger and heavier except in those rare instances where excess of involution occurs.

Immediately following delivery the cervix is soft and its canal is patulous. It is difficult to define the margin of the cervix, it being apparently merged in the vaginal walls. Twenty-four hours after delivery the cervix becomes well defined, although the canal is still patulous. At the end of two weeks the cervix has regained much of its normal shape, the external os still admitting the tip of the finger, although the internal os should be closed. The original size and appearance of the cervix is never regained. The external os, instead of being round, presents a transverse slit, except in instances where it has been lacerated to a greater or a less degree and has not healed, in which case the appearance may be most varied according to the degree of laceration.

During the eighth month of pregnancy certain of the uterine sinuses become obliterated through the coagulation of the blood. After delivery the blood coagulates in the remaining sinuses. Their walls become thickened through the development of new connective tissue. This tissue contracts until the sinuses are completely obliterated. This process is necessarily gradual and the obliteration is not completed for some months after delivery.

After delivery the vagina is relaxed and the site of abrasions vary in depth and in distribution. In case laceration has not occurred, or where this has been immediately repaired, involution proceeds rapidly. The vagina, however, never returns to its original size. About six weeks are requisite for involution to be completed.

The repair of the uterine mucous membrane is coincident with involution. The superficial layer of the decidua is in great part detached with the membranes and the placenta. During the few days following delivery the attached fragments of the superficial layer are shed with the lochia. The shortening of the muscular fibres of the uterus forces the utricular glands into a more perpendicular direction and crowds them closely together. As occurs after a thorough curetting of the uterine cavity, the epithelium of the glands proliferates and soon lines the ducts and thence the uterine cavity. This process requires about six weeks for its completion.

The placental site is repaired more slowly than the remainder of the cavity.

For the first few days after the delivery the uterus undergoes contractions of a similar nature to those which assist in the expulsion of the fœtus, although far less intense, and these contractions are known as "after-pains." These pains occur in inverse ratio to the length of labor, and are therefore more frequent in multiparæ than in primiparæ. Their presence is salutary, since they insure the maintenance of firm contraction of the uterus. Where the uterus remains soft after delivery and fills with blood-clots these contractions are very troublesome and will call for alleviation. Either the triple bromides in 10-grain doses each will allay these after-pains, or chloral hydrate in 10-grain doses, repeated every two or three hours. Massage of the uterus, by causing it to contract and expel the accumulated clots, will check the pains.

The discharge from the vagina following labor is termed the "lochia." At the outset the lochia is red and is largely composed of blood. After a few hours, however, the discharge will contain fragments of the membranes and of the placental decidua, as also the secretion from the vagina and the cervix. During the first three days after delivery so much blood is present in the discharge that the term "rubra" is applied to the lochia. As the amount of blood diminishes and the serous element increases the lochia becomes pale red and the term "serosa" is applied to it. This color lasts until about the sixth day. The lochia then consists of serum containing fat-globules and exfoliated epithelium. The color becomes grayish white and the term "alba" is applied to it. At the outset the reaction of the lochia is alkaline, but during the second week it becomes neutral or acid.

The amount of lochia varies greatly in different women. Women who do not nurse their infant and those who normally menstruate freely will have a greater flow. The average quantity during the eight days following delivery has been estimated as being about three and one-fourth pounds, of which the lochia rubra is about two pounds.

Where strict asepsis is observed during the puerperal state the lochia should never have any odor except a slightly stale smell as the discharge decreases in amount.

After the completion of the third stage of labor the uterus can be felt as a hard, firm body through the abdominal wall. It is somewhat pyriform in shape and extends to a point a trifle above a line midway between the symphysis and the umbilicus. The organ is slightly anteflexed and measures about six inches in depth. It is about four and one-half inches in width. Where the rectum and the bladder are full the uterus may be deflected toward the right side and backward. During the twenty-four hours following delivery the uterus ordinarily markedly lessens in size. Relaxation during this period and consequent increase in size is frequently dependent on a full bladder. Involution of the uterus normally progresses so rapidly that about the tenth day the fundus will be found below the level of the symphysis.

From the very beginning of pregnancy the breasts undergo developmental changes which fit them for the secretion of milk. This process of change is gradual and progressive and becomes completed about the first week after delivery. It will be recalled that the breasts are glands of the compound-racemose variety. The gland-structure itself is covered by smooth, delicate skin, and underneath this is a layer of adipose tissue. The glandular structure consists of lobes, lobules, and acini. Canaliculi start from the acini and anastomose to form the canals of the lobules. These canals unite in turn to form a canal for each lobe, and this is termed the "lactiferous duct." The lactiferous ducts terminate in the nipple by small openings, about one-fortieth of an inch in diameter. As the duct passes downward from the nipple it enlarges into what is termed the sinus of the duct. The space between the lobes is filled in with adipose tissue and the whole structure is firmly held together by connective tissue.

The breasts enlarge and grow more firm during pregnancy, from the accumulation of fat between the lobules and the development of new acini. The fluid which is secreted before and during the first few days of the puerperium is known as colostrum. It contains fat, albumin, salts, sugar, water, and large bodies known as colostrum-corpuscles. These latter are derived from the disintegration of the epithelium which lines the acini. This colostrum has a laxative action, and cleanses the intestinal canal of the infant in order to prepare it for the milk, which is secreted about the third day. The early milk does not contain as large an amount of solids as the later, the fluid altering in density as the gastric capacity of the infant becomes better able to assimilate it.

The care which the newborn infant should receive has been dwelt upon in the chapter devoted to that subject. During the first four to six days of its existence the infant will decrease in weight, owing to the small amount of nourishment which it receives. This loss should be gradually recovered, the original weight being regained about the seventh to the ninth day after delivery. The infant's head gradually regains its shape, and the swelling of the presenting part subsides in a few days. At the end of two or three days exfoliation of the epithelium begins and continues for seven or eight days. During this period icterus not uncommonly sets in and, as a rule, passes off without remedy being indicated. In the event of its becoming deeper, then a mild laxative will assist in its disappearance where organic cause does not exist.

Management of Convalescence.

Before leaving the woman, after delivery, the physician should carefully examine her. He should satisfy himself that the uterus has remained firmly contracted. He should look at the vulvar pad to see that the flow of blood is no more than what is natural. This is especially requisite, because, even though the uterus may be firmly contracted, hæmorrhage may be occurring from a lacerated cervix or from some portion of the vagina. He should note the condition of the pulse and respiration. A slow and regular pulse is what we should expect to find unless the woman is greatly exhausted or is losing an undue amount of blood.

The physician should remain by his patient for at least one hour after delivery. Before leaving, written directions should be given the nurse or attendant in regard to the method of controlling hæmorrhage should it occur. The woman should be allowed to rest quietly for a number of hours after delivery, and ordinarily she will sleep. After about four hours the infant should be applied to the breast. This causes contraction of the uterus and assists in maintaining the organ firm.

The diet of the lying-in woman should be bland for the first few days. Milk and light soups are preferable. After the bowels have been thoroughly cleansed and the milk is beginning to be secreted there is nothing gained by the starving process of the past; indeed, much is lost. The woman needs food not only for recuperative purposes, but also to enable her to stand the strain of lactation. Where the course of the puerperium is smooth solid food may be administered carefully after the second or the third day. The amount will vary according to the desire of the woman, and never to the exclusion of milk.

A laxative should be administered the evening of the second day, at least, since the puerperal state will progress to better advantage in case the intestines are kept unclogged. In case the woman is of the constipated type, this laxative should be given twenty-four hours after delivery. Whilst normal evacuations should be secured daily, hypercatharsis should be avoided except it be desired to diminish the flow of milk.

In case the woman finds it difficult to empty her bladder or her rectum in the recumbent posture she may be allowed to sit upon the bed-pan whenever there is no contra-indication from the side of the heart. The popular idea that the woman should maintain the recumbent posture for days after delivery is erroneous. It has been experimentally proven that, where the pulse is slow and regular, it does the woman no harm to begin to assume the semi-recumbent posture within twenty-four hours after delivery. Involution progresses as normally and drainage is better. After the fourth day the woman will be able to assume this posture for the greater part of the day, and the result will be that, when the time arrives for her to leave her bed, she will be in better physical condition.

The consensus of opinion would seem to be that ergot should be administered as a routine measure for the week following delivery. The drug seems to favor involution and the uterus is certainly prevented thereby from relaxing. Thirty drops of the fluid extract may be ordered three times daily. A sixtieth of strychnia three times daily would appear to favor involution.

The physician should see his patient at least eight hours after delivery and should then note the state of the uterus, the amount of lochial discharge, and inquire as to whether the bladder has been emptied or not. For the three days after delivery it will be wise to see the woman, when possible, twice daily, since this is the period when untoward change is apt to occur. The temperature and the pulse should be taken morning and evening for the first week. The nurse or attendant should be instructed to exercise the most absolute cleanliness before touching the woman. She should be instructed to wash her hands and to dip them in a solution of bichloride of mercury 1 to 5000 before changing the vulvar pad and before washing the genitals. The old-fashioned napkins should not be allowed in the lying-in room. Absorbent cotton baked in the oven, or, in the households of the indigent, cloths boiled before use, should take their place. In the households of the well-to-do the sanitary napkins, which may now be obtained everywhere, should be used. They should also be baked in an oven before use. These pads should be changed as frequently as they become saturated. The external genitals should be bathed frequently, a solution of bichloride, 1 to 5000, being used, or a 1-per-cent. solution of creolin. Vaginal douches are never indicated in the normal puerperium; indeed, their routine administration adds to the danger of infecting the woman. The indication for the vaginal douche is odor to the lochia, which is possibly due to the decomposition of a clot in the vagina. In case the odor persists, then the indication becomes stringent to examine the woman carefully for the early detection of a beginning sapræmia. In case a vaginal douche seems indicated it should be administered with absolute asepsis, as is fully exemplified in the chapter dealing with obstetric asepsis (*vide* "Obstetric Surgery"). An intra-uterine douche should never be administered by the nurse or the attendant, but always by the physician, who alone is competent. The indication for such douche will, as a rule, be odor to the lochia which persists after vaginal douching.

The physician who is careful to persuade every healthy woman to nurse her child will do much toward lowering the mortality-rate of children under five years of age. The woman who is not willing to sacrifice social pleasures and personal comfort for the benefit of her child is unworthy to become a mother. Mothers' milk constitutes the natural food of the infant and nothing has been found which will in every respect take its place. Of course, where the maternal condition will not allow of lactation, either because of imperfect development of the mammæ or because of organic disease, the woman cannot properly nourish her offspring, in which case artificial means must be resorted to. When the woman suffers from the distension associated with an excess of milk the application to the breasts of hot cloths for ten minutes, and repeated at intervals, may relieve her; or, what is preferable, the nipples should be covered with a pledget of sterile gauze and a firm compression binder should be applied. The breasts will often thus empty themselves under this pressure. At the same time the amount of fluid taken by the woman should be diminished. In the event of there being an insufficient supply of milk or a diminution in the amount, a strong infusion of the milk-plant—the *Galega officinalis*—may be ordered in tablespoonful doses three to four times daily. At times there will result an increased supply.

The period when the woman should be allowed to leave her bed is very variable. As a rule, the uterus has involuted below the pelvic brim by the tenth day, and the woman may be allowed to leave the bed and to spend a portion of the day on a lounge. She should not be allowed to walk until the fourteenth day, and then after a gradual fashion. As long as the uterus has not involuted below the pelvic brim, in particular if the red lochia tend to recur on much exertion, it is wise to limit the exercise which the patient will take, and often it may be necessary to keep her in bed. It is the after-care which the woman receives which tends to allow the uterus to return to a fairly normal condition after labor, and which will do much toward the prevention of uterine diseases, in particular uterine displacements.

The resumption of sexual intercourse should not be permitted until after the second month, since the pelvic congestion which the act entails interferes with proper involution of the pelvic organs.

There remains to be considered the method of rearing the infant artificially in cases where, for one or another reason, the woman is unable to nurse. Unquestionably the milk of another woman is the ideal substitute, but in practice great difficulties are met. It has been truly said that the "model wet-nurse should be a woman of suitable age who has lost her own child at about the same age as the foster-child. She should have a breast of good and abundant milk; be free from actual or heredity predisposition to disease; possess a kindly disposition and an even temperament; have no vicious, gluttonous, lazy, or uncleanly habits; be animated by a love of children rather than the money-value of her services." If such a woman could be found, then unquestionably the best substitute for the woman herself would be the wet-nurse. But, unfortunately, the average woman to be secured is the very reverse. She enters the household and at once assumes that all should bow to her and be subservient to her wishes. She thinks that the parents of the infant will put up with all her whims and demands lest the infant suffer. She either drinks or develops a taste for liquor. As a rule, she is fonder of a lie than the truth, and if she does not neglect the baby she may drug it. Again, notwithstanding the most careful examination, hereditary or acquired disease, such as syphilis, may be the legacy she will leave the babe.

On the above and other grounds it will resolve itself into the physician prescribing some artificial food for the infant. There is no food which can take the place of milk, and that of an animal must be utilized. Cows' milk is universally obtainable. The milk of a cow, however, unmodified, is not fit for the newborn babe. It contains a greater proportion of casein than does woman's milk, and it coagulates in the stomach into dense curds which the infant's gastric juice cannot digest. It also contains a greater proportion of butter than human milk, and therefore fat-acids are almost certain to form, and this upsets the infant's digestion. Proper dilution with water, in a measure, renders cows' milk suitable for the average infant.

It is immaterial whether the milk is obtained from one or more cows, provided the animals are healthy. By obtaining the milk from a number of cows the average quality is more readily secured. The milk should be as fresh as possible and it should be sterilized at once by means of boiling, a sufficient quantity being prepared to suffice for twenty-four hours' feeding. The following formula for preparing milk for the infant will be found reliable: Dissolve 20 grains of French gelatin (this is about two inches) in half a pint of hot water. Add 1 teaspoonful of pulverized arrowroot and 5 grains of sugar of milk. Strain a half-pint of milk so as to distribute the cream evenly and add this to the mixture. Add one tablespoonful of cream in order to bring the amount of fat to the proper standard. The entire amount is well stirred and poured into a sufficient number of nursing-bottles to answer for the twenty-four hours' feeding. Place the bottles in a steam-sterilizer and heat to a temperature of 212° F. The bottles having been sealed with rubber stoppers, the milk will remain perfectly sweet. The child should be given a bottle every two hours, up to the age of three months, during the day-time. It will soon become accustomed to sleep from four to six hours during the night. In case the infant is constipated the amount of cream added is increased, and the reverse holds where the child has watery movements. A small pinch of salt should be added to each bottle. In case of acid fermentation a little bicarbonate of soda may be added.

Those who have the care of the infant must be impressed with the fact that, unless the bottles and the rubber nipples are kept perfectly clean, intestinal disturbance is sure to result. The bottles must be well scalded before filling with milk; the nipples should be inverted and scrubbed with a brush. When the nipples are not in use they should be kept in a solution of boric acid. The nurse should never be permitted to use anything except the plain nipple which fits directly over the bottle. No tube extending into the bottle should be allowed, since it is practically impossible to keep it clean. As soon as possible, the child should be trained to take its milk from a cup.

CHAPTER X.

THE PATHOLOGICAL PUERPERIUM.

THE boundary-line between the physiological and the pathological puerperiums is rarely sharply defined. It has been seen that, under normal conditions, the retrograde phenomena of the puerperal state are not constant in their course, largely because the woman never can approach labor in the *ideal* condition. We can hope, therefore, only to lay down approximate rules for the determination of the minor deviations from the physiological puerperium, laying stress on the fact that watchful care will rarely overlook excess in these boundary-line phenomena, since on early recognition and on prompt treatment will depend the aborting of major complications.

Prophylaxis, armed expectancy,—such should be the rôle and the attitude of the physician during the puerperal state.

The student who has been grounded, as he should be, in the young science of bacteriology will appreciate the fact that the study of the pathological puerperium may be much simplified. Even though as yet the foundation of our modern belief may be in minor details a trifle insecure, the keystone is well laid, and on this is inscribed the words "wound infection" as the definition of alteration of the physiological into the pathological. A possible exception is termed sapræmia, although it may eventually result in septicæmia, and, when traced to its source, this is found to be dependent on the development or on the result of the activity of pathogenic organisms. That is to say, sapræmia following decomposition through infection becomes in import the same septicæmia which follows wound infection.

The term "puerperal fever" may still suffice for the laity. It can have but one meaning for the physician, and this is septicæmia, blood-poisoning, wound infection, the absorption of products of decomposition altered through infection into a virulent poison.

Whence the infection?

Three possible sources have been described and each, in turn, has carried weight in the past in the nosology of so-called childbed fever. These sources are: the atmosphere; the body of the puerpera; material of an infectious nature, or capable of causing infection, brought in contact with the genital system of the puerpera (including under this term the mammary glands).

Reference to the first two possible sources may well be brief, since modern knowledge and belief have relegated them well nigh to the shelf of oblivion, where they rest as evidence of past erroneous teaching.

Atmospheric infection of the puerpera as a cause of septicæmia, whilst a comforting belief, since it casts the responsibility on nature, is not a tenable one. Given a puerpera delivered after an aseptic fashion and cared for similarly afterward, and she may lie in an infected room—whether the infection be erysipelas, measles, scarlet fever, etc.—and the puerperium may be unaffected so far as septicæmia is concerned. She may develop either of these acute infectious diseases, but they run their proper course, only modifying the puerperal state in so far as arrest of retrograde metamorphosis is concerned. If she die, the lesions peculiar to the intercurrent disease will be found. Aside from arrest of involution of the sexual organs, we may find nothing suggestive of septicæmia. On the other hand, as will be noted shortly, let the erysipelas or the scarlet-fever infection material be brought into direct contact with the wounded genitals of the puerpera and septicæmia may follow, modified or not by the development of the infectious disease from which the contact-virus emanated. If she die, the lesions due to infection—the lesions of septicæmia—will be found in addition to those peculiar to the intercurrent disease; for instance, scarlet fever or erysipelas *plus* septicæmia.

For years the doctrine of auto-infection played a prominent rôle in the nosology of so-called puerperal fever. It was contended that the poison developed within the body of the puerpera and led to those pathological changes which resulted clinically in septicæmia. Such theory is untenable to-day, in view of the proven fact that spontaneous generation of disease is not possible, and, again, in view of the fact that the recognized causative agents of disease are never found in the healthy body.

Given a woman in good health, delivered aseptically and treated thereafter in the same manner, then, unless infectious material be brought to her, she will remain in the same state of health, the transient modifications being only such as are normally associated with the processes of normal retrograde metamorphosis in the puerperal state. Apparent exceptions are offered by those cases where, during labor or the puerperal state, an abscess of the ovary or of the tube ruptures, partly or in entirety, giving rise to a clinical symptomatology like that of puerperal sepsis. Unquestionably here the sepsis emanates from the body of the puerpera, but this is a pure epiphenomenon of the puerperium. Before labor, before pregnancy, the source of infection lay quiescent in the ovary or the tube, which had precedently been infected by the reception, perhaps, of gonorrhœic virus or as the result of a badly-managed abortion.

A further exception is apparently offered by instances of what has been termed sapræmia. A woman in good health is confined aseptically. By oversight a portion of placenta or of membrane is left in the uterus. This decomposes, and, if not removed, the woman becomes infected. But why does it decompose? Because, notwithstanding all our care, it has become infected. Scores of cases prove that such remnants are carried for days and finally shed without the woman suffering harm. Where they do affect her we will find that the reason is that infectious material has been brought to the woman's body and that these remnants have become infected. To go further, it has been proven that the organisms which produce putrefaction cause the development of ptomaines which may themselves be toxic. The modern consensus of opinion in reference to this matter may be summarized as follows:—

In putrefaction tissues micro-organisms are at the bottom of the process. Infectious material is thus produced, and, if the excretion of these substances is interfered with, septic infection results. Now, the very entrance of these micro-organisms interferes, or, rather, may interfere, with excretion, and, therefore, we possess in the body, under the given conditions of putrefaction, material which not alone may poison, but which may interfere with excretion, from which necessarily infection will result.

Thus far, then, our argument has shown that the source of puerperal sepsis must be looked for outside of the body of the puerpera, and we have determined that the infectious material must be brought to the body of the woman.

Let us recall the condition of the recently delivered puerpera. We assume that the act of labor has been conducted aseptically and that the accessible lesions of the genital tract have been repaired after established rules, in order to close every possible avenue for the entrance of infectious material. Still there remains a wounded surface which offers a site for infection, and this is at the placental insertion. Micro-organisms enter the genital tract and reach this site nothwithstanding every possible precaution taken by the physician. Now, if the body of the puerpera lack the requisite resisting power, if, in other words, she is in a condition below the normal, then, her resisting power to the onset of disease being lessened, these micro-organisms flourish, the soil they ingraft themselves upon being suitable for their growth. A living ferment is at work in the tissues. Destruction of tissue may take place, or else ptomaines and leucomaines are formed. The final result is the same: The production of infectious material which poisons the body of the puerpera and leads to the symptoms of septicæmia. As will be noted later on, these symptoms vary, in a measure, according to the point of entrance of the pathogenic bacteria, the effects being purely local at the start and being kept local through the proper treatment, or else the effects being generalized and most rapidly fatal in character.

Puerperal septicæmia, therefore, is never endogenous in origin. It is always exogenous; that is to say, emanates from without. Whence the corollary dwelt upon so frequently, that the most absolute asepsis should be associated with the conduct of labor and the care of the puerperal state; and whence the further corollary that, when puerperal sepsis develops, one or more of the attendants on the woman are culpable, even though the source or the manner of infection cannot be determined.

The careful student of bacteriology will remember that a number of pathogenic bacteria have been isolated, and that, through experimentation, we are in a position to-day to expect the development of certain specific symptoms if one or another kind of bacterium gain entrance to the system. In the neighborhood of forty have been isolated as being the source of septicæmic or pyæmic processes. The student is necessarily referred to works on bacteriology for a description of the bacteria, all that we aim at accomplishing here being to impress the fact that the clinical symptoms vary with the kind or the kinds of micro-organisms which have gained entrance into the system, with the nature of the soil where they have lodged,—whether rich in lymphatic supply, for instance, or not; and, finally, that the sum-total of the clinical symptomatology must necessarily depend on the resisting power of the person in whose body they have obtained foot-hold. A puerpera weakened by precedent disease obviously will resist the onset of these infectious elements to a far less degree than the woman who has reached her term and has passed through her labor with undiminished or, rather, unweakened vital forces. All this explains the degree of virulency which the same disease—septicæmia—offers in different women infected at the same time, and after the same fashion, and at a similar site. How far this resisting power depends on the action of the leucocytes of the body is yet to be proved through careful study and research. So much may be taken for granted now, and this is that these leucocytes appear to offer a barrier to the entrance of bacteria into the system and to oppose their progress when once they have gained a foot-hold. The teachings of modern pathology only render stronger the data established from clinical study of the disease known to-day as septicæmia.

The changes found after death are of the most varied type, and yet they are only similar to those which follow death from septic infection aside from the puerperal state. The accentuation of the lesions may be more marked around the genital tract, but the systemic findings are exactly alike in sepsis following an infected wound of the arm, leg, or face as after an infection of the puerperal tract. One great fact stands prominent, and this is that the lesions vary and are widely spread, according to the lymphatic supply of the part first affected. Remembering that, first, we need a wound or abrasion where the infection may enter, it is evident that any part of the genital tract may be the site of primary infection. The lacerated perineum or cervix, the wounded endometrium at the site of placental separation,—such are the obvious points of infection. Later on in the puerperal state the abraded nipple may become infected, giving rise to a mastitis with consecutive systematic infection.

When we remember the vascular supply of the sexual system, increased manifold during pregnancy, and when we recall the rich lymphatic supply of the same system, it is not surprising that infection, starting in this locality, should very readily spread to the various serous cavities of the body and be deposited by the veins in every organ.

According to the site of the primary infection the lesions at the start are diffuse or not. Systemic infection, we repeat, supervenes, with greater or less rapidity, according as the point of primary infection is rich or not in lymphatics. Thus, infection at a perineal laceration, even though it takes on the so-called diphtheritic type, through energetic and timely local treatment, may be checked prior to the occurrence of much systemic infection, and much more speedily than can infection emanating from a lacerated cervix or the body of the uterus. Here the lymphatic supply is so rich, leading to the tubes and ovaries and the peritoneum, direct extension through the tubes being further possible, that general systemic infection may be most rapid in character.

Even in the most rapidly fatal forms of puerperal infection, where the local and the systemic lesions do not have time to become sharply marked, we shall find the lymphatics and the veins affected.

From his studies in pathology the student has familiarized himself with the essential changes associated with septicæmia. Before passing in review the clinical features of puerperal sepsis we would again emphasize the fact that, pathologically, the affection entails simply the same changes as those which follow infection of a wound in any part of the body aside from the puerperal state.

Clinically, puerperal septicæmia offers a varying symptomatology, according as the infection affects chiefly one or another of the pelvic organs and according as the infection is detected early and treated promptly. It seems to us wise to study the disease as an entity, and not to confuse the student by endeavoring to sharply differentiate a symptomatology of one infected organ from another. Very rarely, indeed, will one organ be affected, or the part of one organ, without there being consecutive affection of another. Again, it is the exception that the symptoms of infection of the system at large do not predominate over the signs offered by the local lesion. Under the subjects of treatment and of prognosis we will dwell at length on the characteristics of the individual lesions. By following this course we best impress the fact that we are dealing really with a systemic affection, even though the starting-point be a local lesion.

We proceed to note the alterations in the customary phenomena of the puerperal state known as the normal phenomena, laying stress on the meaning of certain groups of symptoms (objective and subjective). The point to remember is that we may meet with septic vulvitis, vaginitis, endometritis, metritis, salpingitis, oöphoritis, peritonitis, cystitis, etc., and each may offer cardinal evidence of its presence; but the systemic disease is the same, the constitutional disturbance only varying according to the degree and the extent of the primal lesion.

Infection of the woman may occur before labor, during labor, or during the puerperal state.

Ante-partum infection is uncommon, but when it occurs the course is ordinarily very rapid and fatal; so that on autopsy but little evidence of systemic infection is found except that the lymphatics and the veins are affected. The woman never reaches the normal puerperal state. She is confined either in the midst of systemic septic disturbance, characterized by chill, high temperature, and rapid pulse, or else these symptoms follow closely on delivery. Instances of this nature are rare, except in times of epidemic, when one woman after another is rapidly infected and as rapidly dies. Nowadays such experiences are unheard of, and such an occurrence would reflect the most lamentable ignorance and the most culpable neglect.

As a rule, it is about thirty-six hours after delivery that the first symptoms of septic infection manifest themselves. Chill is by no means a marked precursory symptom except in the so-called fulminating types of sepsis, where the woman seems to pass from health into death. Very frequently, even though the woman has a chill, it passes unnoticed. The average puerpera reacts very readily to emotional disturbances, and, therefore, a chill, should it be noted, may have no significance of evil impending. Its occurrence should, however, awaken our anxiety, even as it would aside from the puerperal state. Its significance carries the same weight as it does when it ushers in any acute affection. It may mean a developing pneumonia, or, indeed, in paludal districts, it may be only something which the woman has for years suffered from at irregular intervals. If, however, it be followed by fever of a non-intermittent type, then, in the puerperal state, our first thought should be of septic infection.

The pulse-rate affords, as a rule, most valuable evidence of alteration in the smooth course of the puerperium. A slow pulse is incompatible with sepsis in its early stage. A rapid pulse is a danger-signal. Either hæmorrhage is impending or else it may be septic infection. Danger from hæmorrhage is practically at an end thirty-six hours after delivery, particularly if on palpation the uterus is found to remain hard. Where the pulse increases in frequency and the temperature rises above 99° to 100° F. about the third day, impending mischief of a septic nature may usually be suspected. Formerly, this constitutional disturbance was laid to the incoming of the milk,—the so-called milk fever. To-day such a fever is not recognized. The establishment of the function of lactation in a woman in good health is not accompanied by constitutional disturbance. A frequent cause of disturbance about the third day, however, is the fact that the intestinal tract has not been properly cared for. There is an absorption of intestinal products resulting from retained fæcal matter, and thence the rise in temperature and in pulse-rate. A laxative should clear the scene. If it does not, then, in case no intercurrent disease is developing, sepsis is.

At once the most careful examination of the woman is called for. If the pelvic floor has been lacerated, sloughing in this locality may be found, or, possibly, the developmental stage of the so-called puerperal diphtheria. Should the pelvic floor be found unaffected, and if, on examination, the urine present none of the characteristics of a cystitis, then the cervix should be examined by speculum for sloughing process or similar pseudodiphtheritic appearance. This failing, the uterus must be carefully questioned. We are proceeding, in other words, by a process of exclusion, to establish at an early date the source of the infection whilst it is amenable, possibly, to local treatment; at any rate, before general systemic infection has progressed to a great degree.

Probably, in the vast majority of cases, septicæmia emanates from the uterus. Either its lymphatics have absorbed the septic virus directly or else a decomposing mass lies in its cavity and becomes infected. In the first instance we may have a rapidly supervening salpingitis and peritonitis; in the second instance we have, first, a sapræmia (a poisoning from the absorption of the products of decomposition), and, secondarily, a septicæmia with local lesion in the endometrium at the outset. If the process be not checked here, then, in succession, a metritis, a salpingitis, an oöphoritis, and a peritonitis may develop.

As a rule, it may be stated that the relation between the pulse and the temperature in the puerperal state is of exceeding value from a prognostic as well as a diagnostic stand-point. Acute septic conditions, where the system is surcharged, as it were, with the poison, are associated with great rapidity of the pulse and very low temperature. The system is deeply shocked by the poison; we have a condition of collapse, as it were, the temperature ranging about 99° to 100° F. and yet the pulse-rate averaging 120 to 140. A scene of this character carries the most gloomy diagnosis and prognosis. On the other hand, where the lesion is more of the acute inflammatory type and the systemic infection is slight, we are apt to have a high thermometric range, whilst the pulse remains relatively slow. Thus, in an endometritis, where the infectious lesion does not extend beyond to the tubes and the ovaries and the pelvic cellular tissue, we may note for days, until resolution, the temperature ranging from 103° to 104° F. whilst the pulse-rate remains at 115 to 120. The most virulent of all types of puerperal septicæmia—general purulent peritonitis—is usually associated with low temperature and high pulse-rate, and often, also, with flat instead of tympanitic abdomen. In short, in the puerperal state the pulse furnishes a more reliable prognostic guide than does the temperature.

Associated with rapid pulse and elevation of temperature the lochial discharge becomes altered. The lochia may be partially or altogether arrested; it may become foul, giving rise to what has been termed fœtor.

Arrest of the lochia may be the result of diminished excretion. the associate of the systemic infection, or the arrest may be only an apparent one, due to stenosis at the internal os with consequent retention and stagnation. In either event careful aseptic local examination will differentiate. If there be retention from flexion the examining finger will find the body of the uterus bent on the cervix at the level of the vaginal reflexion, and, if means be taken to straighten out the flexion, the lochia will again appear, whilst if there be arrest of secretion it will not. In the event of there being stagnation without septic infection, the constitutional disturbance will abate on the restoration of the flow. Diminished or impeded excretion of the waste products certainly causes systemic disturbance,—as is shown by the rapid pulse and the rise in the temperature, even aside from infection; but, in such a case, the temperature is apt to be high and out of proportion to the pulse-rate, whilst in deep systemic infection, as we have noted, the pulse is apt to be high relatively to the temperature. Should infection of the stagnant lochia ensue, then we may have consecutive infection of the tubes, ovaries, and peritoneal cavity.

Fœtor of the lochia is simply a sign of decomposition and is an accompaniment of sapræmia. A uterus may be infected and yet there may be no odor to the diminished lochial discharge. A sloughing pelvic floor or cervix may give rise to fœtor, and such a source should always be differentiated before we conclude that the uterine cavity is at fault. The most common source of fœtor is a portion of placenta or of membrane or a decomposing clot in the cavity of the uterus.

In this connection, then, it is to be remembered that the most acute type of sepsis may be absolutely unassociated with fœtor, whilst on the early recognition of fœtor and on its prompt treatment sapræmia may be aborted before it merges into a septicæmia.

In early sepsis pain is usually absent. As a rule, it becomes marked as the peritoneum becomes affected. Of course, pressure over the septic uterus will evoke pain, but we are now speaking of spontaneous pain. As systemic infection deepens and the various organs become affected this pain emanates from each in turn or is present in all. Thus we may have a complicating septic pleurisy with as sharp a pain over the affected lung as in case of pleurisy unassociated with septic infection. When the veins of the lower legs become thrombosed, giving rise to a phlebitis, the pain is of an acute type. Similarly, the pain associated with exudate in the pelvis is sharp and radiating. When the systemic infection is deep and associated with peritonitis of the purulent type, pain may be absent altogether, or, in case of rupture of an accumulation of pus into the peritoneal cavity, the pain may for a time disappear.

The intestinal tract sympathizes markedly with the systemic septic phenomena. Further, these phenomena are aggravated if the intestinal canal be not kept functionating. Such constipation may be the result of the septicæmia, particularly where the peritoneum is affected, when absolute paresis of the intestine frequently ensues. As a result, we have tympanites with the consequent pain in the abdomen and interference with respiration from pressure on the diaphragm. As the lesion of the peritoneum becomes more intense the intestinal coils cannot move, since they are firmly held by the bands of lymph or adhesions which are thrown out.

The upper digestive tract sympathizes, of course, as is shown by the coated tongue and the nausea and the vomiting. As the infection deepens the skin assumes the characteristic sallow hue and the exhaled breath has a sweetish odor. The woman lies in a species of typhoid condition from which it may be very difficult to rally her. Possibly, now, septic emboli are thrown off and metastases into the various organs of the body occur, giving rise to a pyæmia. Each embolus is apt to give rise to fresh constitutional disturbance, as evidenced by the repeated chills and alteration in the temperature-rate. In short, we are now dealing with nothing else than the pyæmia which occurs, independently of the puerperal condition, as the result of the infection of a wounded surface on any part of the body. It is the same story, only modified in so far as we are dealing with a puerperal woman.

As the systemic septic infection deepens the cerebral centres become affected, as is certified by the delirium, active or low in type. Concomitantly with the embolic deposits the various paraplegias and hemiplegias may develop. These affections of the brain and of the spinal cord may be temporary or remain permanent. Puerperal mania and puerperal insanity may develop and in course of time disappear or the intellect may remain affected.

In short, there is no organ and no system of the body which may not become affected by the sepic process, even as holds for septicæmia occurring aside from the puerperal state. If the woman ultimately recover it is rarely that she regains the normal in function. Some trace of an organic nature is apt to remain, be it in the nervous system, the kidneys, the heart, etc.

Such may be the clinical course of puerperal septicæmia, looked at from the broad stand-point of general systemic infection. We will now consider more in detail the separate local lesions, tracing as far as feasible the clinical picture offered by affection of one or another of the sexual organs and noting the treatment applicable in each case.

Clinically, we may differentiate the following septic diseases:—

Septic vulvitis and vaginitis.
Septic metritis and endometritis (including sapræmia).
Septic salpingitis and oöphoritis.
Septic peritonitis: (1) local; (2) general.
Septic thrombosis.
Pelvic cellulitis (including pelvic abscess).
Septic pyæmia.
Late puerperal infection.
Puerperal mania and insanity.
Puerperal tetanus.
Mastitis.

Septic Vulvitis and Vaginitis.—The vulva and the vagina, in particular the pelvic floor, are peculiarly liable to infection, since they are very accessible to contact. Rarely, further, is a labor terminated without the vulva being subject to a greater or less degree of contusion, and the pelvic floor, as a rule, suffers a certain amount of lesion, even though this be limited entirely to rupture of the fourchette. If the act of delivery has not been conducted aseptically, or if, during the puerperal state, care be not taken as regards asepsis, infection is likely to set in, and, in case of the development of local or general symptoms altering what we expect during the normal puerperal state, the vulva and the vagina should be the first locality to investigate.

Infection of the vulva, aside from sloughing and thrombosis, is very likely to spread to the glands of Bartholin. The infectious element gains access to the glands through the ducts, and this is followed by abscess. Possibly these glands may have been infected through a precedent gonorrhœa which has apparently been cured, but the latent virus has remained there, and the septic infection is characterized by a gonorrhœal complication.

Infection of the vagina may be direct at the wounded or abraded surface or it may be traced to the material used to suture a laceration. Improperly-sterilized catgut or silk will often be the starting-point of infection, and for this reason we prefer, for suture material in the emergency-surgery which lesion of the pelvic floor demands, a material, such as silk-worm gut, which may be readily rendered sterile through boiling for ten minutes.

Septic vaginitis may show itself by an increased secretion from the vagina, purulent in character and associated with a greater or a less degree of sloughing, or else we may find characteristics which, from their similarity in appearance, have been described as a diphtheria of the vagina. It is very questionable if we are dealing with a process similar to that which occurs in the throat, although clinically it makes no difference, since we have the same infiltration of the submucous tissues and the same constitutional infection.

The appearance of the vagina in these cases of so-called diphtheria is, at the outset, that of a surface covered with grayish dots which cannot be removed readily; that is to say, we are dealing with an infiltration, and not with the mere formation of a membrane on the surface of the vagina. Later these small points coalesce, giving us the appearance of a dirty-grayish deposit on the vagina. On bacteriological examination it will be exceptional that the bacillus of Löffler, which is pathognomonic of diphtheria in the fauces, will be determined, and thus we may differentiate the condition from a true diphtheria. In principle it matters not, since the treatment will be identical.

As complications of septic infection of the vulva and of the vagina we often find extension to the urethra and the bladder or to the rectum, giving us a cystitis and a proctitis. A more common cause of this cystitis, however, is careless catheterization by touch instead of by sight, and without precedent disinfection of the introitus. The characters of these complications are simply like cystitis and proctitis occurring aside from the puerperal state as the result of infection. We have painful defecation and micturition, followed by the passage of pus from the bladder or the rectum. On inspection of the rectum or the bladder we will find the mucous membrane denuded and the site of an active inflammatory process.

Septic vulvitis is likely to be followed by infection of the inguinal glands, leading to suppuration and to abscess formation, or the veins of the thighs may become affected and puerperal venous thrombosis may occur in one or another thigh, giving us the so-called milk-leg.

If not checked in an early stage the infection from the vagina may extend to the cervix and thence to the endometrium.

Whilst a certain amount of constitutional disturbance is associated from the start with septic infection of the vulva or of the vagina, the chief symptoms are local. Thus, there is swelling of the vulva, with possibly induration of one or both of the glands of Bartholin, and the woman complains of a sense of burning and of heat in the vagina. The temperature may rise one or two degrees above the normal and the pulse-rate will always be accelerated, as is common to all affections which affect the general system. The woman further complains of pain on micturition, not necessarily because the bladder is affected, but since the urine flows over the posterior commissure, which is inflamed.

These symptoms simply become intensified as the inflammatory process progresses. In case of sloughing or the formation of the pseudodiphtheritic membrane the temperature may range over 103° F. and the pulse be accelerated in proportion, rising to 130.

It is obvious that early recognition and prompt treatment is requisite to prevent extension and sloughing, which latter might speedily lead to the formation of fistulæ into the bladder or into the rectum.

According to the intensity of the local lesion and the amount of lymphatic absorption, the constitutional disturbance will vary. Usually the secretion of milk will be arrested or become diminished.

The lochial discharge will also sympathize with the constitutional disturbance, becoming arrested or diminished as the temperature rises or not. The lochia further will become fetid, but the source of the odor will be the sloughing and not decomposition in the uterine cavity, unless, indeed, the two processes are combined.

Since these lesions are the result of infection of wounds or abrasions of the vulva or pelvic floor, the symptoms will appear early or late, according to whether the infection enters during labor or at any time during the puerperal state, for as long as the wounds remain unhealed infection is possible.

The treatment of vulvitis is aseptic and expectant until evidence of suppuration offers. Aseptic cold compresses to the swollen labia will add much to the comfort of the woman, as well as in a measure modify the temperature rise. Abraded surfaces should be washed with a solution of bichloride 1 to 5000 a number of times daily, and dusted with iodoform, aristol, or bismuth, or, preferably, touched with the stick of nitrate of silver. As soon as there is evidence of suppuration, under aseptic precautions incisions should be made, the various pockets being opened up, in order to avoid extension. In case one or both of the glands of Bartholin suppurate the incisions should be made into the gland along the inner surface of the labia; the abscess-wall should be curetted and cauterized with carbolic acid; tincture of iodine and carbolic acid, equal parts; or even the actual cautery may be used. The sac is then packed with aseptic gauze and thereafter treated as any abscess-cavity would be.

If the site of infection is a perineal wound which has been sutured, the stitches should at once be removed, the infected surface washed off with bichloride solution 1 to 5000, and then cauterized with nitrate-of-silver solution 60 grains to the ounce. We thus destroy whatever germs are active on the surface, and we form a wall of the albuminate of silver through which new infection will find it difficult to enter. After cauterization the surface may be dusted with iodoform or bismuth. A number of times daily the affected pelvic floor should be irrigated with bichloride solution 1 to 5000, or with 1-per-cent. creolin solution, and afterward dusted again with one or the other powder. Vaginal douching should be avoided so long as the lesion is localized at the introitus. The only effect of douching would be a possible infection of the upper vagina or the cervix.

Cystitis is to be treated according to the recognized methods apart from the puerperal state. The bladder should be irrigated every four hours with a saturated solution of boric acid, and diluents should be administered *pro re nata.* Eurotropin, 5 grains every four hours, internally, may be tested to advantage.

Proctitis is best treated by the local application of a solution of nitrate of silver 60 grains to the ounce. This application is, of course, to be made through a speculum.

So-called diphtheritic vaginitis calls for the same treatment, except that the measures at the outset should be more radical. The application of subsulphate of iron, which is strongly recommended, we do not favor, since the caustic effect is but slight and superficial and the resulting slough is very prone to decomposition. Cauterization with the chloride of zinc in 50-per-cent. solution is highly recommended, but we question if it be necessary to cauterize so deeply aside from the difficulty of limiting the action of the zinc. Where the process is just beginning the whitish patches may be touched to advantage with the actual cautery, or they may be scraped off with the curette and a solution of nitrate of silver, 60 grains to the ounce, may be applied. In case the infiltration has extended widely before it is discovered we believe that the best measure is thorough cauterization of the surface with the actual cautery. The surface is then kept powdered with iodoform or bismuth and carefully watched for the detection of evidence of spreading, when the same cautery should be used. In view of the favorable effects derived from resort to antitoxin in diphtheria of the fauces, in the event of the process in the vagina being true diphtheria—as evidenced by the finding of the Klebs-Loeffler bacillus—injection of the antitoxin suggests itself as a wise measure.

The treatment of local lymphatic extension will be referred to under the heading of "Septic Thrombosis," since the affection of the lymphatics is usually associated with that of the veins.

The constitutional treatment is self-suggestive. An abundance of liquid food—in particular, milk—should be given, and stimulants according to the condition of the pulse. It will do no harm to give 5 grains of the carbonate of ammonia every four hours as a routine measure, since the tendency of septic poisoning is to weaken the heart. In case the stomach is not tolerant the drug may be given in double the dose by the rectum. The bowels should be kept regular by laxatives and enemata, and opium should be avoided except when stringently called for, when codein should be tested in large dose—1 grain by the mouth and 2 by the rectum—before other alkaloid of opium is administered. The temperature rise need not be a source of anxiety. It is simply an evidence of the systemic infection, and it may be kept within limits by the application of an ice-bag. Antipyretics should be avoided,—in particular the coal-tar derivatives, which have such a weakening effect on the heart.

Metritis and Endometritis.—Whilst endometritis may exist and run its course without the concurrence of metritis, the presence of the latter necessitates the former. The etiological factors are extension infection from the lower genital tract, direct infection at the site of placental separation, contact infection by unclean hand or instrument introduced into the uterus, infection from a sapræmia, the result of the decomposition of clot or remnant of placenta or of membrane left in the uterine cavity.

It is essential to differentiate sharply the infection following on sapræmia from that which results apart from the latter, since the clinical signs are different, as also the demanded treatment.

Infection following sapræmia, or putrid infection, may be an early or a late phenomenon of the puerperal state. Ordinarily the symptoms manifest themselves about the third day, but in many instances nothing abnormal may be noted until a much later date, in certain cases not until the woman has been practically discharged from observation. Remnants of placenta and of membrane or clot (partially organized and partially attached) may remain in the uterine cavity for days without giving rise to local or constitutional symptoms, so long as these retained particles do not become infected. For this reason the symptomatology is of the most varied nature.

Ordinarily the course of events is as follows: About the third day we note increasing rapidity in the pulse-rate without elevation of temperature above 99° F. Chill may occur, but usually it is slight or absent altogether. It is more likely to be marked in instances where the lesion is of a sharp inflammatory nature from the start, instead of being characterized by a process of slow systemic poisoning, so to speak. The lochial discharge very shortly becomes altered. There is apt to be diminution in quantity and the color becomes darker and the consistency thicker. Gradual diminution or suppression of the lochia is only likely to set in at an early date, where there exists, as a complication, stenosis of the cervix with defective drainage. The odor of the lochia shortly alters; it becomes stale or of a most pronounced necrotic quality. On local examination the uterus is found to be larger than it should be at the stage of the puerperal period, and it is also softer on bimanual palpation. As the case progresses the endometritis merges into a metritis, and then we find a soft, boggy uterus, tender on pressure. Pain is apt to be absent until the tubes and the ovaries or the uterine covering of the peritoneum become affected, when, in addition, there is present a variable amount of tympanites, the evidence of paresis of the intestines, the result of the systemic infection. If the condition be overlooked or if the proper therapeutic measures are not resorted to, the general systemic infection progresses through lymphatic absorption and direct extension through the Fallopian tubes, and we note the development of peritonitis, local and general, with, at a still later period, thrombosis and embolism and pyæmia.

Should the endometritis be the consequence of contact infection without sapræmia, the symptomatology is different, and the physician, unless especially observant, is apt to be led astray. In these instances fœtor of the lochia is a late and not an early symptom. When it occurs it is due to the necrosis and the separation of the infected endometrium, and this process does not set in until the infective element has been at work for many days. In aggravated cases not only does the endometrium necrose, but the process extends to the muscularis, and a cast of the uterine cavity may ultimately be shed, giving us the very rare condition of a puerperal dissecting metritis. As a rule, in the condition of the endometrium we are considering, there is apt to be a chill at the start, the result of the rapid development of the inflammatory process in the endometrium and the consequent rapid systemic infection. The temperature rises more rapidly, although, as in the case of all acute inflammatory processes, the pulse-rate sympathizes,—the reverse of that which occurs at the outset of a sapræmia, where the pulse-rate is rapid, out of proportion to the temperature rise. The lochial discharge is diminished or suppressed at the start, becoming, as a rule, free and even profuse later on, as the necrotic endometrium separates. Extension to the tubes and the ovaries and to the pelvic peritoneum very frequently occurs early, by both lymphatic extension and by direct route through the tubes. Pain, again, is not a marked factor until the peritoneal coating of the uterus is approached. Tympanites develops early, because the intestinal tract necessarily sympathizes with the systemic infection. Ultimately, if the process is not recognized early and treated after the recognized fashion, we note the development of all the characteristics of general systemic infection,—multiple thrombosis and embolism. Unfortunately, an endometritis developing apart from a sapræmia is not as amenable to treatment. It may be stated that sapræmia is one of the most frequent of puerperal deviations from the normal, and that, when recognized early and treated properly, it is most readily cured.

The clinical course portrayed above is by no means constant. Frequently, particularly in case of sapræmia, we shall note marked remission or even intermission in the symptoms. This occurrence is due to fresh systemic infection, either because the treatment applied has not been thorough or else because, during certain of the requisite manipulations, asepsis has not been complete. Thus, apparently, the woman is convalescing, the alarming symptoms having abated, when, of a sudden, there is renewed chill, rapid pulse-rate, and elevation of temperature. If this recurrence cannot be traced to recrudescence in the original local affection, then it is evidence of the extension of the process to the tubes or the peritoneum.

The treatment of these forms of endometritis differs markedly. It is very essential to differentiate them from the start. We are convinced that a great deal of harm has been done by resort to the curette in one of the forms, even as a great deal of harm has resulted from adherence to the douche in the cases where much more radical measures are demanded.

The first step is accurate diagnosis. The lower genital tract is carefully investigated by sight and by touch to exclude infection here. The interior of the uterus should then be investigated by the finger, for this is the only way to differentiate a beginning sapræmia from contact infection of the endometrium. In order to examine the interior of the uterus it may be requisite to administer an anæsthetic, but this should always be done where need be, since on careful differential diagnosis will depend the limiting of the infectious element or process at a time when extreme radical measures are not requisite. Anæsthesia by nitrous oxide is eminently feasible for this careful exploration of the interior of the uterus, and it is to be hoped that, before long, a fairly portable apparatus for administering this gas will be devised. Chloroform, as a rule, however, will answer, since the anæsthesia need rarely be prolonged. If the examining finger find the cervix wide open it is evidence that there is a foreign body in the organ, for such is usually the case, unless there exists stenosis at the level of the internal os. The body of the uterus is depressed by the external hand, and thus the examining finger may reach the fundus of the organ and examine the entire interior. In case clot or remnant of placenta or membrane be present the finger will recognize it, and it will also be able to form some idea of the extension of the infectious process beyond the point of attachment of the necrosing particles.

Frequently the finger may remove the putrid mass, and then, if the endometrium feel normal—that is to say, if it does not yield to the touch the sensation of a soft tissue on the point of breaking down—a douche of bichloride 1 to 5000 or of creolin 1 per cent. may be sufficient to cause the symptoms of putrid infection to abate. Rarely, however, will this be the case. As a rule, the infection has spread to the entire endometrium, and then a careful curetting, as is described in "Obstetric Surgery," is called for.

In the event of the examining finger determining a stenosis, with consequent retention of the infected lochia, thorough irrigation of the uterine cavity should be resorted to before the use of the curette is indicated.

In case the examining finger does not find anything in the uterus, then curetting is not called for until a later stage, when the necrosing endometrium begins to separate. Indeed, curetting in this condition will result in harm. The process may be as yet purely local on the surface of the endometrium, so to speak, and, if we curette, we simply open channels for fresh systemic absorption. It is in these instances that the repeated intra-uterine douche is indicated. This should always be administered by the physician, and creolin should be used instead of the bichloride, since a large quantity of the solution will be requisite at frequent intervals, and there is considerable danger of poisoning. It goes without saying that the manipulations should be characterized by the most absolute asepsis, otherwise the net result will be new infection. At the outset it is wise to wash out the uterus at least every three hours, unless the lochia become fetid, the index of necrosis, when the curette is called for.

In putrid infection, after careful curetting, we believe it good practice to pack the uterus with gauze, not for the purpose of drainage, but in order to keep the abraded uterine walls apart. This gauze should not be left in longer than twenty-four to thirty-six hours, since at the end of this period there has inevitably collected a certain amount of detritus, the portion of the endometrium which has escaped the action of the curette, and this is simply retained by the gauze, which only allows the serum to escape. The gauze is therefore removed, the uterus is irrigated aseptically, and a fresh packing is inserted. Iodoform gauze is ordinarily recommended for this purpose, but we have become rather circumspect in its use, since we have often noted poisoning. In view of the fact that we possess in alcohol one of the most efficient germicides, it has been suggested that irrigation of the cavity with alcohol take the place of bichloride or creolin, etc. A sterile rubber tube is inserted into the organ and sterile gauze is packed around this tube. The tube is connected with a gravity syringe containing alcohol (95°), and thus the interior of the uterus is kept bathed, as it were, by the alcohol. The method is a complicated one, and Grandin prefers packing the uterus with gauze saturated with alcohol. This procedure has rendered him service repeatedly in the cases under consideration.

In all septic conditions it is requisite to keep up the bodily strength; therefore the administration of the carbonate of ammonia in 5-grain doses every three hours is indicated at the start. Other stimulants, such as whisky and brandy, we prefer to reserve for later stages of the process should we be unable to abort it early.

The prime reason for radical treatment of septic endometritis from the start is to prevent the extension of the infectious process to the tubes, ovaries, and peritoneum, when the remedial measures are necessarily of a much more radical type. This constitutes a further reason for supporting the system, as far as possible, by the administration of plenty of readily-assimilated food; so that, should the process extend further, the woman may be in as good a condition as possible to stand the operative measures which may be forced upon us.

Attention to the intestinal tract is, above all, called for, else the concurrence of absorption of fæcal products will obscure the diagnosis of the progress of the local affection. It is not sufficient to empty the bowels by enema, but every night, where requisite, a laxative should be given. A calomel purge is an excellent thing to start with, giving a half-dozen triturates, 1 grain each, one every hour, and then a saline should follow. Thereafter one or two compound cathartic pills at night will keep the intestines in order, particularly as the woman will be receiving liquid food, which is in most part absorbed.

Pain not being marked, it will rarely be necessary to administer an opiate, and this is fortunate, since we are exceedingly desirous of not paralyzing the intestines. An ice-bag applied over the abdomen, and kept on as long as the temperature ranges over 101° F., will quiet the slight amount of abdominal pain present as long as the infectious process remains local, and this will also spare tissue waste, which is associated with continuous high temperature.

An endometritis and a metritis may remain localized for weeks without extension to the tubes or the peritoneum. This fact is firmly established by clinical observers, and therefore it is well to sound a note of warning against accepting too readily a growing teaching, which is, that if the local process does not yield within short order, then, if we desire to avoid infection of the peritoneal cavity, with its concomitant great risk as regards the woman's life, the time has come when dallying with local measures should cease, and extirpation of the septic organ is indicated. We freely grant that this procedure is preferable to the gloomy outcome of attempts at curing general septic peritonitis, but the difficulty, as yet, is to decide what case is going to be cured by local treatment after the manner outlined and what case is going to pass into infection of the tubes and peritoneum. The physician who has been in a position to follow clinically such cases from an obstetrical standpoint, as well as the gynæcological, is less likely to err on the side of ultra-operative enthusiasm than he who has only witnessed septic endometritis and metritis and their sequelæ as a gynæcologist. We are satisfied that the vast majority of cases of septic endometritis will resolve under the modern treatment applied early, even though the course of the affection be a most protracted one, and therefore we counsel against the rash assumption that early hysterectomy is demanded. Where the infection is certainly progressing toward infection of the peritoneum, as becomes evident, usually, by the diminishing temperature rise and the increasing pulse-rate and the increasing tympanites unrelieved by the administration of laxatives and of enemata, where the symptom of abdominal pain becomes marked, then the time has come for hysterectomy, although, unfortunately, since this is an operation which calls for an expert, it will rarely be performed outside of large medical centres. And yet, when properly indicated, it is the operation which promises hope of saving a percentage of cases which will otherwise be lost. When performed, the vagina should be selected as the route, for reasons noted later on.

The technique consists in opening the anterior and the posterior *cul-de-sacs*, entering the peritoneal cavity, ligating or clamping the broad ligaments, removing the uterus and then the appendages. The details of the technique must be studied in treatises on gynæcology, although the operation should never be undertaken unless the physician is familiar with these details either from practice or from observation. This major operation has been performed repeatedly during the past few years, usually with failure; in a minority with success. Certain of the reported cases, however, strengthen us in our opinion that as yet we are unable to determine at an early-enough stage to be of benefit the instances where hysterectomy is stringently indicated. Thus, it is no credit to the operator and a discredit to the science to remove a uterus and to find in its cavity a portion of necrosing placenta which, had it been detected through digital examination and thereafter removed, would have rendered unnecessary the radical procedure. Indeed, there exists to-day in obstetrics no question of greater importance than the determination of when hysterectomy becomes indicated. It is a question which, sooner or later, the sober judgment of the many workers in the field will determine upon, and, meantime, it is well to protest against illegitimate operating of which a few—a very few—have been guilty.

When, notwithstanding all our care, the infection extends beyond the uterus, we note the development of septic infection of the tubes, the ovaries, and the peritoneum and cellular tissue. The symptomatology of these affections is often blended, and therefore we describe them clinically together.

Peritonitis, Local and General; Pelvic Cellulitis; Salpingitis, and Oöphoritis.—Although pelvic cellulitis unquestionably complicates the puerperal state independently of peritonitis, it is preferable to consider it as a subheading of the latter, in order to impress on the student the fact that, as a rule, it is an associate. This is what should be expected when we remember that the cellular tissue of the pelvis is either surrounded by the peritoneum or else is in intimate contact. It is established, however, that, whilst it is exceptional to see peritonitis without implication of the tubes or the ovaries, cellulitis may occur and suppurate, and the woman recover with intact appendages.

The infection of the cellular tissue of the pelvis is through the lymphatics. Whilst, aside from infection, an exudate may be witnessed and may run the familiar course,—the so-called traumatic cellulitis,—cases of the kind must be looked upon with exceeding skepticism. The most common cause etiologically of puerperal cellulitis is infection from a laceration of the cervix. In such a case, about the third or the fourth day after delivery the woman may have a chill, although this may be so slight as to pass unnoticed. On local examination a bogginess of one or both lateral vaginal *cul-de-sacs* will be determined; that is to say, a sensation of fullness associated with evidence of congestion. The temperature rises often to 103° F. and the pulse is proportionately accelerated. These subjective symptoms continue from a few days to a week, when on local examination the vaginal *cul-de-sacs* will be found tense. Whilst the malaise of the patient has been exaggerated, in case there is no implication of the peritoneum or of the appendages there will not be present tympanites. In the event of the affection being traumatic the chances are that the high-grade symptoms will continue, gradually abating as the exudate is absorbed. On the other hand, if infection has occurred, after an interval varying from a week to two the *cul-de-sac* on the affected side will be found to soften and concomitantly the temperature is apt to drop, whilst the pulse-rate remains high. Such are the evidences of pus formation and of beginning systemic infection. We will find in such cases the development of what is termed pelvic abscess. The localization of the exudate which has broken down is extraperitoneal, and the indication is to incise the abscess-cavity *per vaginam* and to treat it aseptically. As a rule, the above symptomatology is much more obscure. It may be that there are signs of peritoneal infection, such as tympanites and pain extending over the abdomen instead of being localized over the side where the exudate is determined. In such an event it requires often the most expert touch and knowledge to determine whether peritoneal infection has occurred or not. Examination by the rectum will tell us, frequently, that the appendages are affected, there being evidence of marked congestion and, at times, enlargement. Again, we may note nothing special by the rectum except the exudate under or within the broad ligament. In this case it is advisable to order hot douches frequently repeated, and to meet the temperature rise by the ice-bag or, in case the rise is not over 102° F. and the abdominal pain is not especially marked, poultices. If, at the expiration of twenty-four to thirty-six hours, the tympanites increases and the local signs do not abate or offer evidence of local pus formation, the time has come for an exploratory abdominal section. Temporizing with a slowly-developing infectious peritonitis is out of the question. In every case where the evidence is strong that the tubes or the ovaries are affected by the septic process, early removal of the source of peritoneal infection offers the woman a chance of recovery. Otherwise, as will be noted, the chances are against her, no matter what the line of treatment resorted to.

Salpingitis and oöphoritis complicating the puerperium are the result of infection extending, as a rule, from the uterine cavity. Remembering the lymphatic distribution of the pelvic organs, infection of the tubes or the ovaries by these channels is perfectly possible, but such an occurrence is exceptional without coincident infection of the peritoneum. The tubes and ovaries may become affected, and, if the infection be not of a virulent type, then complicating peritonitis may not ensue, and, after a variable interval, the symptoms may abate, leaving the woman with diseased appendages. In these cases the symptoms are not apt to be marked. Pain over the affected region is present, but rarely of an acute type. The febrile disturbance is slight, as also the constitutional disturbance. On local examination congestion, varying in degree, will be noted at the outset in the broad ligaments, and, after subsidence of the acute stage, there will be determined more or less exudate around the appendages, with fixation, according to the amount of peritoneal and cellular implication. The treatment will consist in poultices in case the temperature rise does not exceed 102° F., or the ice-bag if the reverse hold true. Opiates should be withheld so as to be in a position to properly meet the peritonitis which may complicate. The bowels should be kept unloaded for a similar reason and also to obtain the derivative effect on the pelvic circulation.

In instances where the tubal and ovarian affection is of a higher grade, within a few days we shall obtain evidence of peritoneal infection, such as tympanites and diffuse abdominal pain. Even then the peritonitis may remain local, in which case the termination may be resolution of the acute process, with remaining disease of the appendages, or local abscess. In the latter event,—that is to say, if the symptoms instead of abating increase in severity, as shown by the increasing tympanites and abdominal pain, and locally by the bogginess in the region of one or both broad ligaments,—the course of action must depend on whether the pus points toward the vagina or above Poupart's ligament. As soon as pus formation is determined, or where there is strong ground for suspecting it, in case it is possible to evacuate it by incision in the vagina this site should be selected. If it be not possible to reach it here, then, after certifying the presence of pus by conjoined examination under anæsthesia, the wise course to pursue is to open the abdomen and to remove the appendages. This statement holds unless the diseased appendages are below the pelvic brim, when vaginal section is to be preferred to abdominal. In obscure cases, especially late in the puerperium, it is advisable, in any event, to examine through a vaginal incision, when frequently it will be possible to remove the appendages by this route and thus minimize the danger of general peritoneal infection. The general treatment is to avoid opium as far as feasible in order not to intensify the intestinal paresis, to administer laxatives so as to favor peristalsis and elimination as far as is possible by the intestinal canal, and, further, in order to limit, in a measure, the formation of intestinal adhesions. Nourishing food and stimulants *pro re nata* are obviously indicated.

Peritonitis may be the result of extension from the tubes through the fimbriated extremities or by direct rupture of accumulations of pus, or else it may result from infection through the lymphatics. Clinically, it is hardly feasible to differentiate the source of infection except in cases where the disease of the tubes has been watched for a variable period and there is superadded peritonitis.

Pre-existing pyosalpinx, or ovarian abscess, may rupture during the course of labor or at any time during the puerperal state and set up a peritonitis. In this event the peritonitis becomes simply an epiphenomenon of the puerperal state and cannot then be traced to puerperal infection. These cases are excessively rare, since women suffering from pyosalpinx or ovarian abscess, if the disease is bilateral, are not able to conceive. When the rupture occurs, however, the peritonitis is of the most virulent type, especially if the infection emanate from an abscess of the ovary. Speedy development of a peritonitis after delivery, as shown by the chill and tympanites, should always awaken the suspicion of the attendant. The subjective symptoms may not be marked. The chill is likely to occur, but there may be no marked elevation of temperature or much tympanites. The nerve-centres are, as it were, paralyzed by the infection; the facies may look pinched within a few hours, the pulse-rate may be high although the temperature is low, and the belly may be flat. In these cases there will usually be present a history of precedent pelvic disease to guide us in our diagnosis; but, whether there is or not, the treatment resorted to must be prompt, otherwise the woman is inevitably lost. Indeed, too often she dies, notwithstanding the promptest treatment. This treatment is abdominal section, the removal of the ruptured appendages, the flushing and cleansing of the peritoneal cavity as far as possible, and multiple drainage.

Similar remarks are pertinent to instances where a complicating appendicitis leads to peritonitis in the puerperal state.

Aside from these factors, peritonitis complicating the puerperal state must be traced to infection extending either by direct route from the uterus to the tubes or by the lymphatic supply.

Where the infection is slight and the lesion partakes more of the inflammatory type and less of the infectious, it would seem as though the clinical symptoms were different, although, at the present, this statement is made with reservation. Inflammatory excess is shown by the high-grade subjective phenomena. High temperature and gradually increasing tympanites unaccompanied by absolute paresis of the intestinal tract, even though the initial chill may be very severe and the gastric disturbance very marked, may lead the physician to suspect that he is dealing with an attack which is more benign as regards life. The treatment justifiable here is expectant. The ice-bag on the abdomen, maintained as long as the temperature remains above 102° F., will control excessive rise of temperature and, in a measure, quiet abdominal pain. The woman should be fed by enema if the stomach is intolerant, and this may be continued for days if the rectum be frequently flushed with cold water. Attempts should be made to keep the bowel unloaded by enemata of ox-gall and saturated solution of Epsom salts; but it is useless to endeavor to administer laxatives by the mouth, owing to the intolerance of the stomach. Opium, if absolutely called for, should be given by suppository, codein being used in 2-grain doses, since it has less tendency to upset digestion or to limit peristalsis. In the event of the attack being mainly of an inflammatory type, the symptoms should abate at the end of a week. Locally, unless there be a complicating cellulitis, nothing may be determined. At the end of about a week possibly, on examination by the vagina, fluctuation may be detected, in which case the peritonitis has been localized, and vaginal incision and drainage of the pus collection is called for. In case the symptoms subside in intensity as regards the temperature rise and the tympanites, and yet the pulse remains relatively high and the facies become pinched, then the chances are that the peritonitis is of an infectious type, and, in order to give the woman a slim chance of life, abdominal section is called for.

Where the symptoms are not high-grade at the outset, or where they measurably increase as regards the evidence of general septic infection, as shown by the rapid pulse, out of proportion to the temperature rise, then surgical treatment is called for, although it must be confessed that, where the peritonitis is generalized, the woman's chance of life is very slender. The result obtained in the past through the administration of large doses of opium must have been in instances where the peritonitis partook of the inflammatory type with a minimum of the infectious element. The same statement holds for cases of recovery under the free administration of salines. Those who have opened women with general septic peritonitis and have seen the wide distribution of the pus, incapsulated under all the abdominal organs, will be loath to believe that either the free administration of opium or of saline can save these women. The fact is that general puerperal peritonitis, occurring from lymphatic infection, is simply an epiphenomenon of general systemic infection. On autopsy the veins and the lymphatics throughout the system will be found gorged with pus and infectious elements, and where the case has been protracted similar deposits will be found in every organ of the body. The women die from general septic infection and not from the peritonitis. Hence the urgency of either preventing the development of general septic peritonitis or of removing the source of infection early, where it can be traced to the tubes and the uterus.

Local peritonitis may run as high-grade a course as may general, often more so, and this obscures differentiation. If the symptoms of peritonitis tend to run a long course we may rest assured that we are dealing with a local process, and with a process where operative interference for the removal of the source of infection, usually the tubes or ovaries, will often result in the saving of the woman.

In instances of local peritonitis we may or we may not be able to palpate at an early stage the exudate which forms around the focus of infection and shuts off the general peritoneal cavity. The tympanitic distension of the abdomen may be as aggravated as in case of general peritonitis, and this will interfere with palpation. On vaginal examination, however, as a rule, it will be possible to determine the lower boundary of the exudate in one or the other broad ligament. In this event, if the exudate approach the vault of the vagina, the proper course of procedure is to open the posterior *cul-de-sac*, enter the subperitoneal space, and evacuate the pus by the vaginal route and drain. This is not curative in that the probable source of infection is the tube, but the evacuation of the pus will enable the woman to emerge from the puerperal state and later, if need be, an operation may be undertaken for the removal of the diseased appendage or appendages. Not infrequently the pus attempts to point in the abdominal wall, above Poupart's ligament. In such an event the incision should be made parallel with this ligament, and when the abscess-cavity has been opened counter-drainage should, whenever feasible, be established into the vagina. Drainage is thus more perfect and convalescence is shortened. The systemic treatment applicable to these cases of local purulent peritonitis is to support the woman's vital powers through the administration of an abundance of easily-digested food associated with stimulants according to the demands of the heart. Febrile rise may be controlled by the application of an ice-bag over the abdomen, and here, as elsewhere when dealing with septic complications, the intestinal canal should be kept functionating.

General purulent peritonitis emanating from infection of the uterine cavity must receive the most speedy surgical treatment if we would hope to save the woman. In the event of a septic endometritis not yielding markedly within twenty-four to thirty-six hours of the application of the radical treatment we have elsewhere dwelt upon, the symptoms of peritoneal infection becoming marked, —that is to say, the tympanites becoming aggravated and the pulse-rate being elevated out of proportion to the temperature rise, which latter, we would again emphasize, may be only a degree above normal,—then recently-reported cases seem to prove that the time has come for operative interference of the most radical nature, in order to give the woman a slim chance of life. It has been certainly established that if the peritonitis became generalized the woman will die, no matter what the treatment. We must forestall this generalization by removing at once the source of the systemic and the peritoneal infection,—comprising the uterus, the tubes, and the ovaries. According to the skill of the operator, total extirpation may be resorted to by the vagina or by the abdomen. The former is the route which is associated with the least systemic shock, but it is also the route which offers to the inexperienced the greatest difficulties. Whatever the route selected, we must remember that after total ablation we have only succeeded in ridding the system of the source of fresh infection. We still have to deal with the infection which entered the system before operative measures were resorted to, and this demands food and stimulants, attention to the function of the intestinal canal and of the kidneys. In cases of systemic sepsis the latter organs require an abundance of water in order that they may be kept flushed and the system be thereby relieved of the waste product, which otherwise simply adds to the sepsis. The rôle played by urea and its derivatives in intensifying septic phenomena is of as great importance as that of the ptomaines absorbed from the intestinal canal. It is in cases of this character that the anti-streptococci serum has been utilized of late years, and the reports which have reached us have been of the most varied character. *A priori*, we should expect this serum to be alone of value in cases where the streptococcus is proved to be the infectious element, and yet careful study of the majority of recorded cases teaches that rarely has the observer taken the trouble to differentiate the causal factor of the infection; indeed, often the record would point to sapræmia as the cause of the disturbance, and this we know yields readily to the early treatment elsewhere described. As a rule, in the puerperal state we are dealing either with saprophytic infection or else with infection of the mixed type, and therefore antistreptococcic serum can hardly be expected to yield benefit. In streptococcic infection, on the other hand, the serum has fairly established itself as of value, and in doubtful cases it is not alone justifiable to use it, but it is incumbent on the operator so to do. Grandin has tested it in a number of instances, and from his experience the following rules for administration are laid down: At the outset secure a reliable serum, and at the present the Marmorek is alone vouched for; inject 10 to 20 cubic centimetres at once, and note the effect. If the temperature falls, if the pulse-rate is lowered, the inference is that the serum is of value, in which event repeat in the dosage of 5 to 10 cubic centimetres every four hours. In cases observed by Grandin and others the subjective phenomena (from the side of the temperature and the pulse) are bettered and the secretion from the kidneys (and therefore the elimination of certain infectious elements) is greatly increased. Not infrequently chill follows on the injection of the serum, and at times nausea and cephalalgia, but these symptoms are not alarming. Up to the present the ground to assume in regard to the serum is that, whilst it may do good, it is not likely to harm, and that, the condition of the woman being most desperate, it is incumbent on us to use any and every remedy offering even a slender hope.

Septic infection which takes on the chronic type is associated with thrombosis or offers the manifestations of pyæmia. Thrombosis is a late manifestation of the septic puerperium, and ordinarily shows itself in the veins of the lower extremities. We thus witness the development of what is popularly known as "milk-leg,"—a phlebitis and lymphangitis of one or both the lower extremities. Phlebitis and lymphangitis of this nature may either develop as a late manifestation of general sepsis or the puerperal state may have been on the surface uncomplicated, when, from the tenth day to the third week after delivery, the woman complains of dull pain in one or the other thigh, increasing in intensity and gradually associated with swelling and œdema. There may or may not occur a precedent chill; the temperature rise, however, is apt from the start to be high except in those instances where the complication sets in as a late manifestation of a protracted attack of systemic sepsis, when the phenomena are more apt to be low grade. This phlebitis runs a protracted course and subjects the woman to the risk of embolism of a fatal nature. The treatment consists in bandaging the affected extremity and administering an abundance of easily-digested food. Stimulants, such as the carbonate of ammonia, 20 to 30 grains in the twenty-four hours, should be given from the start. Counter-irritation by iodine over the course of the affected vessels is useful, in particular where the lymphatics markedly participate in the affection. Absolute rest in bed must be insisted upon.

Nowadays it is not often that we observe septic pyæmia. The reason doubtless is that the modern methods of treating sepsis in the puerperal state are more radical from the start, and such deep systemic infection as was formerly the custom rarely develops. The course of a septic pyæmia is exactly similar to that which is associated with wound infection apart from the puerperal state. Abscesses develop in remote parts of the body and in all the organs, and, whilst the course of the disease may be most protracted, the result is almost always death. The treatment at our disposal is purely nutrient and stimulant, meeting the complications as they develop; that is to say, opening the abscesses which become apparent on the surface. Possibly the antistreptococcic serum may benefit. In any event, its use is indicated.

Late Puerperal Infection.—Under this term are understood instances of infection which manifest themselves from the sixth day to even as late as the third week after delivery. The course of events is somewhat as follows: The woman passes through the early days of the puerperal state without any appreciable deviation from the normal. Of a sudden she has a chill or chilly sensations or else —and this is the most common course—the temperature shows an evening rise to 100° or 101° F. If the physician does not make the evening visit or if the nurse does not take the evening temperature this deviation from the normal may pass unnoticed. The woman loses her appetite and sense of well-being. If these symptoms occur at a period when there is still a lochial discharge this is arrested for an interval and then returns either profusely or else in diminished amount and with necrotic odor. There evidently has occurred arrest of involution, for on careful examination it will ordinarily be noticed that the uterus occupies a higher position than it is customary to find at the given date after delivery.

This symptomatology, although, as has been noticed, it is not exact or especially pathognomonic of any lesion, should awaken at once the anxiety of the attendant. Careful digital exploration of the pelvic organ is called for, since, to emphasize a point frequently dwelt upon, it is, above all, requisite in the puerperal state to meet local septic complications early, before they have an opportunity to become generalized. The chances are—and this may be stated as the rule—that the source of the infection is in the uterine cavity if the systemic symptoms cannot be traced to the mammary glands. It is exceptional for infection of the tubes or the ovaries to develop thus suddenly at a late period of the puerperal state. Examination of the interior of the uterus, if need be under anæsthetics, will usually reveal a portion of the placenta or a piece of membrane which is necrosing. In the event of there being present in the uterus a foreign body such as the above, the organ is not only larger than it should be, but the cervical canal is open, and it is a comparatively simple matter to remove the necrosing remnant by the finger, which is preferable to the curette, since thus we may not alone be certain that we are removing the entire portion, but we may also satisfy ourselves of the condition of the endometrium. If this be necrosed through extension from the infectious remnant, then it will be necessary to curette the diseased endometrium; otherwise it suffices to remove the remnant, to wash out the cavity of the uterus with bichloride 1 to 5000, and then, for a period of twenty-four hours, to pack with sterile gauze saturated with alcohol (95 per cent.). At the end of this time the gauze should be removed under absolute aseptic precautions, and if the systemic signs of infection have abated we need do nothing more. In case, however, there is still a necrotic odor or if the uterus does not show a tendency to contract,—that is to say, to involute,—then it is wise to repack, watching for symptoms suggestive of spreading of the infection, which is not unlikely to occur. Extension to the tubes and ovaries or the peritoneal cavity, whilst uncommon at a late period of the puerperium, where the symptoms of beginning infection of the uterine cavity are recognized early and properly treated, may yet occur, and in this event the treatment dwelt upon is called for.

Puerperal Mania and Insanity.—In women not predisposed to these complications their occurrence must be looked upon as evidence of septic infection. In this latter class of cases the manifestations occur late in the puerperal state, either concurrently with other evidence of infection or else suddenly. Women who have passed through pregnancy in a melancholy state are apt to develop acute mania during the early puerperium, or, at any rate, at some time during early lactation. Women whose constitutions are undermined by an intercurrent attack of an acute affection during pregnancy, or women who are the sufferers from one or another chronic disease, are also apt to develop mania during the puerperal state. Especially is this so if such women are allowed to endeavor to nurse the infant. The system cannot stand the extra strain of lactation, as it were, and the evident corollary is that such women should not be allowed to attempt to nurse.

Mania of an acute type runs the course customary aside from the puerperal state. The temperature is elevated, often to an exaggerated degree, and delirium or hallucinations are common accompaniments, varying in grade according to the systemic disturbance. Careful local examination should be made in order to exclude local sepsis in the pelvic organs as the source of the abnormal symptoms. The temperature rise may be controlled, in a measure, by the application of an ice-bag and ice-cap; absolute quietude of surroundings is advisable; bromides may quiet the mental disturbance, although hyoscyamine in large dose, frequently repeated, answers better. Where the woman refuses food, as she often will, rectal feeding is necessary. Stimulants should be avoided, since they intensify the cerebral congestion which is likely to be present. The course of the mania is apt to be very protracted, even in cases where the tendency is toward cure and not toward permanent insanity. Such patients do far better if they can be removed from home, apart from the anxious solicitude of relatives and friends, for frequently a marked hysterical type associates the mania, and this is fed by oversolicitude.

Mania of a less acute type requires the most careful watching. The woman is very apt to take a sudden dislike to her child, and may destroy it. She is likely, also, to injure herself. Chronic mania passes insensibly often into permanent insanity. It is well from the start to place the woman in an asylum where she may have the care and the oversight so difficult to obtain at home. Aside from this, the woman's condition will frequently alter for the better when she has been removed from her home surroundings, to which, often, she has taken an intense dislike. The treatment of the chronic type of mania is through hyoscyamine in large doses, the administration of an abundance of readily-assimilated food, and the securing of quiet. Obviously, lactation should not be countenanced.

Puerperal Tetanus.—This excessively rare complication of the puerperal state finds its etiological cause in wound infection, even as do all the manifestations of sepsis in the puerperal state. Hardly one hundred instances have been recorded, and the mortality-rate in these approximates 90 per cent. It is seen after abortion as well as after labor at full term, and, whatever the treatment employed, the course is apt to be toward fatal result. Superadded to manifestations of septic infection we see stiffness of groups of muscles develop, associated with tonic spasms. Aside from the treatment demanded by the septic manifestation, of which it is a complication, we can do little. The changes have been rung on the antispasmodics and opiates, but without result from a curative stand-point. Chloral and the bromides in large doses by the mouth and by the rectum will palliate the chief symptoms. The results secured from resort to serum-therapy apart from the puerperal state justify its use here, and perhaps thus the excessive mortality-rate may be lowered.

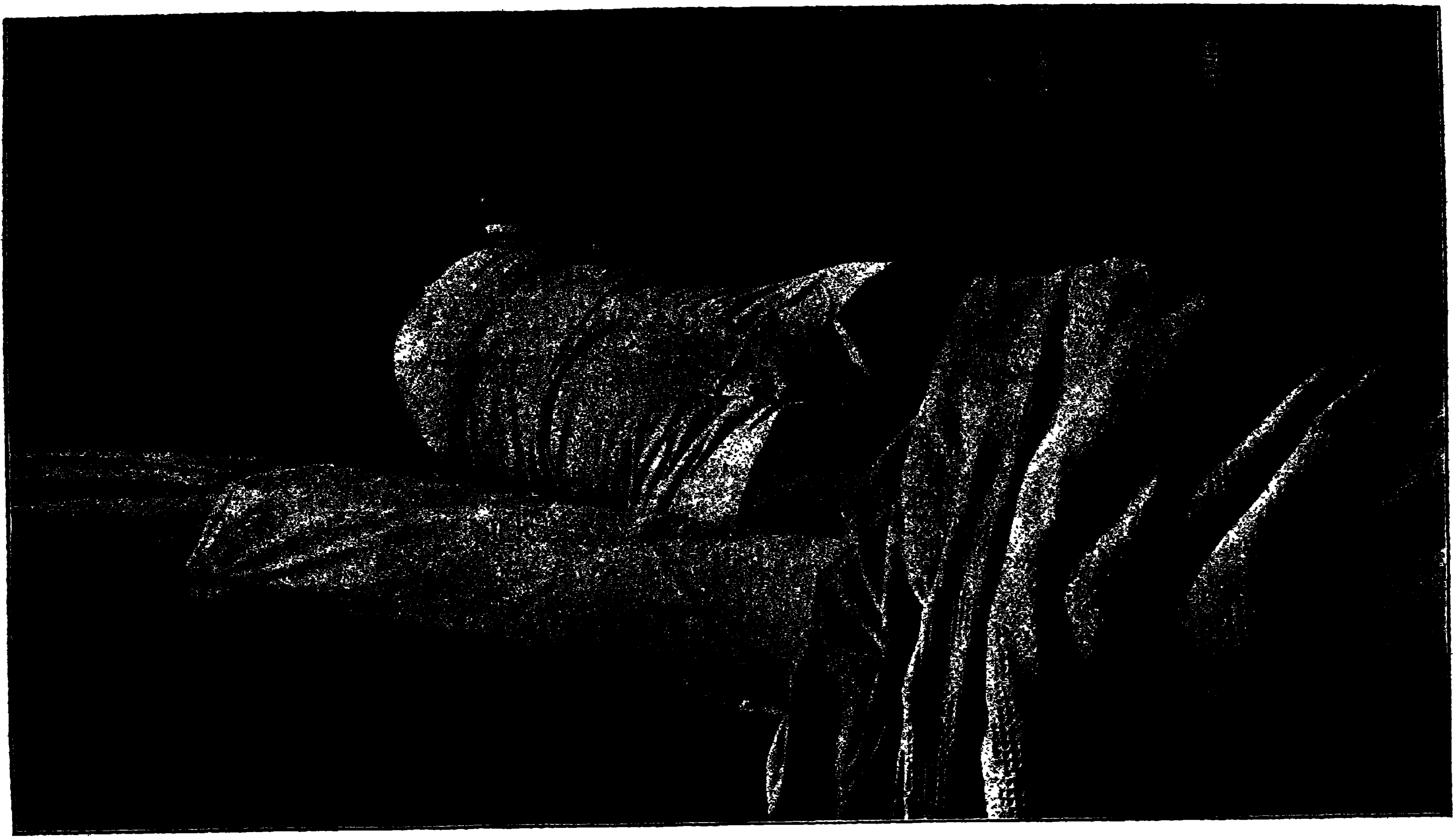
Mastitis.—Again, we note that wound infection is the source of mastitis. The infection occurs at the nipple and thence is carried by the lacteal ducts into the gland, to be drunk up by the lymphatics and disseminated throughout the system. Hence the reason why, during pregnancy and the puerperal state, the greatest cleanliness of the nipple is requisite, as well as the avoidance of applications the tendency of which is toward the destruction of the protecting layer of epithelium. Further, cleanliness of the child's mouth is requisite as well as of the hands of the nurse before she touches the breasts. A not uncommon cause of infection is the woman herself, who touches an abraded nipple with unclean hands.

Cracks in the nipple should be kept aseptic by washing with boric acid in saturated solution, and the cracks should be touched with lunar caustic, thus forming the albuminate of silver and erecting, as it were, a barrier against the entrance of infectious elements. The infant should not be applied directly to a breast the nipples of which are cracked, but a rubber nipple-shield, rendered aseptic by boiling and soaking in a saturated solution of boric acid, should be the intermediary.

The development of a mastitis shows itself frequently by slight chill or only by febrile disturbance, which cannot be explained from the side of the pelvic organs. As a rule, a mastitis develops within the first ten days following the delivery, although infection of the nipple may occur at any time during lactation. We distinguish a glandular and a subglandular form of the affection. As is noted in "Obstetric Surgery," it is essential to differentiate these forms as early as is possible, since the subglandular form may do extensive damage before the local evidence of inflammation offers. The cardinal signs of inflammation characterize the glandular form; that is to say, heat, redness, and swelling of the affected gland. As soon as induration is detected in the gland nursing should be interdicted, although engorgement of the mamma must be prevented by emptying the breast at regular intervals by the hand. Of course, the child may be nursed on the unaffected side, even though this tends to congest the affected side. The application of the child to the unaffected breast at rather infrequent intervals, however, does less harm to the woman than absolute interdiction of nursing may do the child. An ice-bag applied over the site of the induration may abort it before pus formation, and in this septic complication, as in all others, the derivative effect of purging should be resorted to. Diminution in the amount of liquid ingesta allowed the woman will do much toward preventing the accumulation of milk in the gland, although it must be remembered that we thus also diminish the total secretion of milk. Just as soon as there is evidence of pus formation this should be evacuated, as is stated in "Obstetric Surgery."

The submammary form of mastitis in the vast majority of cases will make rapid strides before diagnosis is sufficiently certified to warrant incision. The pus travels everywhere under the mamma, dissecting it off the pectoral muscle, and in unrecognized cases the pus may perforate into the pleura. Usually the local symptom of pain in the affected breast will justify exploration in the absence of evidence of possible source of the symptoms elsewhere. Aspiration under aseptic precautions with a large needle—for the pus is frequently thick—may reveal the presence of pus, in which case free incision, with multiple drainage where necessary, is the treatment. This treatment is exemplified in "Obstetric Surgery."

PLATE XXX.



The Puerperal Breast and Abdominal Binder and the Vulvar Pad.

attendant who administers the douche. For both intra-uterine and vaginal douching immediately after the completion of labor, the ordinary glass tube attached to a bulb or a gravity syringe is the best. In case the douche is intra-uterine, the physician alone is competent to give it. Such a procedure should never be intrusted to the nurse.

The external genitals of the woman are carefully washed with a 1 to 2000 bichloride solution, and then the sterilized gauze pad is applied to the genitals, and this is pinned, back and front, to the abdominal binder.

Whilst the application of the abdominal binder can have no effect, as is the popular belief, on the restoration of the form of the woman, it nevertheless holds true that she is more comfortable if it be used. For a considerable time the abdomen has been subject to the strain of distension, and the sudden relief of this strain seems to call for some support. The binder is applied mainly for the above reason, except in those instances where there is reason to anticipate relaxation of the uterus, and then the binder serves the purpose of holding in position the pad which it is customary to place above the fundus of the uterus to guard against relaxation. (Plate XXX.) The preferable binder is made of unbleached muslin, gored at the sides to fit over the hips. It is pinned firmly so as to give support, never to such a degree as to press the uterus out of its natural relations to the abdominal cavity.

The binder and the pad having been applied and the soiled draw-sheet having been removed, the woman lies in the clean bed and the puerperal state begins, the management of which is considered in a separate chapter.

Abnormal Labor.

Thus far we have traced the course of normal labor. Abnormal labor may depend on deviation from the course of the customary phenomena, either through abnormity in the mechanism or in the position of the presentation. We would lay renewed stress on the fact that any variety of presentation may terminate normally, provided the necessary mechanism be followed. Thus, even as we may have deviations from the normal in case of presentation of the cephalic or pelvic pole of the fœtus, even so may the face and the shoulder presentations terminate normally, provided only that the mechanism requisite for delivery be followed. It serves no useful purpose, therefore, to describe the course of labor under the various presentations. If the requisite mechanism in each case be fully understood there is need for description only of the complications the result of such position of the presenting part as necessarily entails defect in the mechanism.

Under this definition we pass to the description of

ABNORMAL VERTEX PRESENTATION.

It will be remembered that, in order that presentation of the vertex may start the normal mechanism from the pelvic brim under the best possible conditions, the head should present in a position of flexion, which becomes intensified as, under the uterine contractions, engagement and descent take place. Occasionally the vertex presents semiflexed, or, practically, the brow of the fœtus offers instead of the occiput. Under such circumstances, as the uterine contractions tend to cause engagement, one of two things happens: Either the brow becomes converted into a presentation of face or else flexion occurs and we obtain the more favorable presentation of the occiput. The cause of this semiflexed position at the superior strait will usually be found to be an obliquity of the uterus, the result of which is that contractions of the uterus do not act on the short arm of the lever, but on the long arm, and consequently the head offers semiflexed instead of flexed. The rectification of such an anomaly, in case it be recognized before engagement, suggests itself. It consists simply in applying a bandage with an underlying pad over the side toward which the uterus inclines, with the result that the obliquity is rectified; or, the woman may be made to lie on the side opposed to the obliquity, when, under the force of gravity, the obliquity is rectified. In the event of the position being determined, as will ordinarily be the case, after engagement and before the rupture of the membranes, then, by means of suprapubic pressure on the occiput and applied pressure on the forehead by the finger in the vagina, there may result proper flexion of the head, which is what should be aimed at. Ordinarily, however, if the head enter the pelvic inlet in this semiflexed manner the result of the contractions will be to convert the position into one of the face, when, as we have seen, if anterior rotation of the chin take place delivery is perfectly possible through a normal pelvis, only the stages of labor—the dilating and the expulsory—are protracted. We will speak of this further under the subject of "Face Presentations."

Under the subject of "Mechanism of Labor" stress was laid on the untoward nature of posterior positions of the vertex where anterior rotation failed. It was further stated that, in the majority of instances, anterior rotation probably occurred, even though delayed until the occiput reached the pelvic outlet. Still, we are never in a position to predict the case where this anterior rotation may not fail, posterior rotation into the hollow of the sacrum being substituted. In view of the untoward effect of such rotation on the woman and the child, it seems wise to advocate the conversion of the posterior occiput into the anterior as soon as it is detected, and so long as the conditions essential to success without damaging the woman or the child are present. When recognized at the brim, before rupture of the membranes and before deep engagement, two courses are open to us,—the one is version and the other is the manual rectification. Where the pelvis is normal and the child is not too large for the pelvis, version does not seem to us called for. If the cervix is wide enough open to permit of version or if it be dilatable enough, then the insertion of the entire hand into the vagina and the grasping of the child at the neck and rotation of the fœtus, and, therefore, of the occiput into the anterior plane, as specifically described in "Obstetric Surgery," suggests itself as preferable. This entails anæsthesia, but so also does version. The advantage gained, provided the fœtus can be made to occupy the position into which it is altered, is that the chances of the delivery of a living child are greater than when the fœtus is made to engage by the after-coming head, as is necessarily the case after version. Where disproportion between the fœtus and the pelvis exists, on the other hand, it is preferable to elect version, since, in dystocia, due to this cause, the after-coming head molds better than the before-coming. Where the head has engaged by its greater segment before the posterior position of the occiput is determined, then, should the membranes have ruptured, both manual rectification and version are contra-indicated, and the duty of the attendant is simply to watch both the mother and the fœtus in the hope that anterior rotation may occur. Of course, the labor will be tedious, but interference will not be allowable unless either the woman or the fœtus shows signs of exhaustion. In such an event the best that the attendant can do is to apply the forceps and deliver, with the consequent necessary damage to the pelvic floor, unless, even during extraction by the forceps, anterior rotation should occur.

Rarely, in connection with presentation of the vertex, prolapse of a hand or of the cord occurs. Prolapse of the hand by the side of the head delays the labor, because it interferes with the requisite mechanism of labor. The treatment consists in the endeavor to push up the hand, and, this accomplished, if the membranes have not ruptured, then it is wise to break them, in order that, the vertex descending into the cervical ring, the hand cannot prolapse again. Rarely will it be necessary to resort to version to meet this abnormity. If the presenting part has engaged with the hand prolapsed, then it probably will not be possible to replace the hand, and the delay in the labor may be such as to threaten exhaustion, and then the forceps will be indicated to terminate the delivery.

Prolapse of the cord in case of vertex presentation is uncommon, compared with the occurrence in connection with presentations of the pelvic extremity. If it be determined before rupture of the membranes and engagement, then postural treatment will often answer for the correction of the prolapse, or, at any rate, the cord may be saved from pressure during the contractions until sufficient dilatation has occurred to enable us to either rupture the membranes and push up the cord before the head has a chance to engage or else to resort to version.

Very exceptionally we note what is termed an "inclined" presentation of the vertex. In such cases the ear or the parietal protuberance presents at the centre of the superior strait. Such presentations are the result of obliquity of the uterus. In case this presentation does not become rectified, then, since the long occipito-mental diameter of the head offers at the superior strait, arrest of the head necessarily occurs and termination of the labor under the natural efforts is impossible. As soon, therefore, as this presentation is recognized, interference is called for at a time when assistance is comparatively easy, since, if the head become impacted, destruction of the fœtus through diminution in its bulk is the only method of delivery. When the head is still movable, if the membranes are unruptured, as soon as there is sufficient dilatation of the cervix, version is the operation of choice. In case the membranes have ruptured, the whole hand should be introduced into the vagina, the occiput is to be seized, and, during the absence of a contraction, the head is to be pushed up and flexion is to be secured. This, however, is not sufficient, but the head must be maintained flexed until the recurring uterine contractions have caused it to engage in the favorable position. If this manipulation is impossible, then, under deep surgical anæsthesia, whereby the uterus is relaxed as much as possible, the manipulation may succeed. This failing, the only resort, short of craniotomy, is a tentative application of the forceps. We lay stress on the word *tentative*, for, the forceps being applied above the pelvic brim and necessarily grasping the fœtal head so that the long occipito-mental diameter offers at the superior strait, it is questionable, unless the head be small in relation to the given pelvis, if traction will suffice to promote flexion and to cause engagement without the infliction of considerable traumatism on the maternal parts. The good rule, where version and restitution by the hand fail or are contra-indicated from the start, is to resort to craniotomy, unless, in full view of the increased risk, the woman or her representative elect symphysiotomy or the Cæsarean section. These operations will always be contra-indicated when the woman or the fœtus shows signs of exhaustion, since a major operation resorted to in the presence of exhaustion of either can but result in the delivery of a dead fœtus at the greatly-increased risk to the woman's life.

FACE PRESENTATIONS.

Our study of the mechanism of labor has taught us that presentations of the face may terminate under the natural efforts, provided that rotation occurs with the chin to the pubes. It is a fact, however, that, under the most favorable conditions, face presentations prolong labor unduly, and that there is always imminent risk of maternal and fœtal exhaustion. Further, even though the face enters the superior strait with the chin pointing to the antero-lateral plane, in a given case we can never feel sure that, on reaching the pelvic floor, posterior rotation may not occur. The evident corollary is that a presentation of the face, when recognized before engagement, should always, where feasible, be treated either through conversion into a presentation of the vertex by a mechanism of flexion or else that version should be the operation of election. Where the membranes are unruptured, the cervix is dilated or dilatable, the woman being anæsthetized, the hand should be introduced into the vagina and, during the interval in a contraction, the occiput should be seized and the head flexed. This manipulation is not alone sufficient, but the head must be maintained flexed until, under the influence of the uterine contractions, the flexed head has engaged. Manipulation of this nature will rarely be successful without the membranes becoming ruptured, and then, if the manipulation should fail, one of the necessary conditions for version is absent. Unless, therefore, the pelvis be roomy or the child small, we favor the conversion of a face presentation into one of the pelvic extremity by version, when it is recognized at a time when this operation is not contra-indicated. That is to say, the membranes being unruptured, or, if they have just ruptured and the presenting part has not engaged, the cervix in each case being dilated or dilatable, version should be the operation of election.

Where the face has entered the cavity with the chin pointing to one or the other antero-lateral plane, then the duty of the attendant is to stay by his patient and to watch the mechanism carefully. In case there appears to be a tendency to posterior rotation he must interfere, in order to avoid the occurrence of a position which can alone be delivered with safety to the woman through craniotomy. The assistance which may be rendered by the physician consists simply in an attempt to favor anterior rotation of the chin. The most feasible way to do this is to apply the hand to the posterior cheek and to keep it there during contractions of the uterus, in order to prevent the rotation of the chin toward the sacrum. This manœuvre certainly favors anterior rotation, and often after a rapid fashion, thus avoiding a very tedious labor and consequent deleterious pressure on the maternal soft parts and injurious prolonged extension of the fœtal neck.

A partial presentation of the face is simply a presentation of the brow. Such a presentation, if not converted into one of the occiput or even of the face, cannot be delivered by the natural efforts, since the occipito-mental diameter of five inches offers at the superior strait. The indication for treatment, as soon as the presentation is recognized, is to insert the whole hand into the vagina, grasp the occiput, and flex the head. This flexion must be maintained until engagement, otherwise the brow presentation will recur. This manipulation applies, in particular, to instances where the brow presents, the occiput being in front. It is obvious that, in such a case, this is the only method, for, if we convert the impossible brow into a face, we have the equally impossible chin-to-the-sacrum position. Where the brow offers, with the occiput pointing posteriorly, then, if we flex the head, we convert the position into an occipito-posterior, which, we have seen, is an unfavorable position of the vertex. The aim of treatment, in such an event, is to extend the head and to convert the brow presentation into a face, with the chin anterior, or—and this we much prefer—to resort to podalic version if the necessary conditions for version are present,—that is to say, the membranes unruptured or just ruptured, the cervix dilated or dilatable. In case of a presentation of the brow, one or another of these manipulations are called for before the attendant should even think of the application of the forceps. It is simply a mechanical impossibility to deliver a presentation of the brow, before rectification, by the application of the forceps.

PRESENTATIONS OF THE PELVIC EXTREMITY.

The characteristics of a presentation of the pelvic extremity are slow engagement, slow descent, slow rotation, and slow delivery. The pelvic extremity cannot assist in dilatation as can the rounded vertex, and, after engagement, the hips undergo rotation in a more protracted manner than the occiput. A corollary is that the membranes should be maintained intact as long as feasible in order to secure the advantage of the dilating hydrostatic wedge. The normal breech having engaged, the physician need only have patience in the vast majority of cases, simply watching the woman and the fœtal heart-beat in order to interfere if there occur sign of impending exhaustion. Where the pelvis and the fœtus are not disproportionate, and the complete breech presents, it will rarely be necessary to decompose the wedge,—that is to say, to extract the legs in order to favor the emergence of the nates,—the sole precaution here being to follow down the uterus closely as the breech emerges, otherwise the arms may become extended above the head and delivery become very complicated. Not alone must the arms be kept from extending, but the head of the fœtus must be maintained well flexed by suprapubic pressure, for, if extension of the chin take place, the delivery of the after-coming head is exceedingly complicated and usually at the expense of the fœtal life. Indeed, looking at presentations of the pelvic extremity from a broad standpoint, it is the management of the stage of the delivery which may offer difficulties and in which the fœtus is exposed to the greatest risk. Under usual conditions, if maternal exhaustion seem imminent, the labor may always be terminated through extraction even as would be the case had a primary cephalic extremity been converted into a presentation of the pelvic pole. The cardinal rule to bear in mind, therefore, is that, on the emergence of the breech, the uterus must be kept firmly applied to the fœtus, in order to avoid extension of the arms above the head, and that the head in turn must be maintained in a position of flexion except, of course, where the occiput has rotated posteriorly, when, under the necessary mechanism, extension is requisite, in order that the chin may engage under the pubic arch to enable the occiput to make its long sweep over the pelvic floor. The shoulders having been delivered spontaneously, or artificially by flexion and extension over the ventral surface of the fœtus, the sooner the after-coming head is extracted, the better. The child is apt to suffer greatly now through delay. Pressure on the umbilical cord cannot always be avoided and deep asphyxia always threatens. Downward traction on the shoulders, assisted by firm suprapubic pressure, will, in the vast proportion of cases, suffice to deliver the after-coming head, occiput to the pubes. We cannot lay sufficient stress on this downward traction. It is necessary that the suboccipital point should be engaged under the pubic arch before the mechanism of extension of the face over the posterior commissure can take place normally. Rarely, if this point be borne in mind, will it be necessary to resort to the application of forceps to the after-coming head. Further essential details in reference to the management of the after-coming head will be found in the portion of this work dealing with the surgery of obstetrics.

The management of presentations of the incomplete breech—that is to say, of presentation of the feet or foot or of the knee—does not differ from that of the normal pelvic extremity. The same essential points should be borne in mind. The membranes must be maintained intact as long as is possible, and, after delivery of the nates, the uterus must be closely followed down, in order to avoid extension of the chin in case of the normal anterior rotation taking place. There is one complication of these presentations which must be borne in mind as very likely to occur, and this is prolapse of the cord,—an accident which, if not remediable, certainly entails fœtal death. So long as the membranes remain unruptured the fœtus cannot suffer, since direct pressure on the cord is not possible. The attendant, therefore, need only wait and watch, directing the woman to lie, by preference, on the side opposed to that on which the cord tends to fall. This waiting policy is called for, since, until the cervix has dilated or is dilatable, interference of an active nature is unlikely to save the child, for delivery cannot be effected quickly enough with regard to the integrity of the maternal parts. By watching, the physician may take advantage of the period when rupture occurs in order to push up the cord and enable the presenting part to engage and to fill the upper pelvic strait so that there is no space for the cord to slip down.

Such conditions, however, are rather ideal ones. In the first place, prolapse of the cord will only exceptionally be recognized prior to rupture of the membranes. The physician, however, should always remember the possibility of this in incomplete pelvic presentations, and accordingly be prepared to act. If the prolapse occur and the cord cannot be replaced before engagement, then the course of action is to place the cord in that part of the pelvis which is least exposed to pressure, which varies, of course, according to the position of the presenting breech. During the further progress of the mechanism, should the pulsations of the cord become weak or cease altogether, it stands to reason that the sole hope for the child lies in delivery after as speedy a fashion as is consistent with the safety of the woman. The foot or the knee presenting, this is seized and extraction is accomplished according to the rules which govern version, the details of which are found in the portion of this work dealing with the surgery of obstetrics.

Other methods of reposition of the cord, such as the sewing of the gelatinous coating to a soft catheter and the carrying up of the catheter with the attached cord toward the fundus out of the reach of pressure, are not apt to be successful, aside from the fact that the extra manipulations entailed may infect the woman, no matter how careful our technique.

Presentation of the pelvic extremity, with the legs extended along the ventral surface of the fœtus, offers special difficulties, particularly in the final stage of expulsion. The same management of the stage of dilatation and of descent and rotation is indicated, but, when the presenting part has undergone this mechanism, unless the fœtus be relatively small in comparison with the capacity of the pelvic outlet, it will be necessary to decompose the wedge; that is to say, to bring down one or both feet before delivery can be effected. It is at once apparent how difficult this is where the pelvic extremity is wedged in the pelvis and the walls of the uterus are closely applied to the body of the fœtus. In order to reach the feet or even the knee it is necessary to secure uterine relaxation so that the hand may reach the fundus of the uterus in order to grasp a foot or the knee. Even if this can be accomplished, the task of flexing the leg on the thigh and then of bringing the leg down into the vagina is difficult. Surgical anæsthesia will be necessary in order to secure the requisite relaxation of the uterus, and, if the manipulation is successful, delivery should be terminated whilst the woman is anæsthetized.

Where this manipulation fails, and it ordinarily will if the breech is deeply engaged, there are a number of manœuvres at our disposal.

Where the groin of the fœtus is accessible we may be able to pass a sterilized gum-elastic catheter around, thread the eye with a stout sterilized cord, and make downward traction in the axis of the pelvic outlet. This manipulation will, of necessity, be around the anterior groin, since the posterior will be inaccessible, and the anterior must descend first and become fixed under the pubic arch in order to allow the posterior to sweep over the posterior wall of the pelvis. The string, or so-called fillet, is always to be preferred to the blunt hook which is still described in works on obstetrics, since this hook is very apt to injure the fœtus and, if it should slip, will damage seriously the maternal parts. If the groin is accessible and the fœtus and the pelvis are normally proportionate, then, frequently, the breech may be brought down by inserting the finger of one or the other hand into the groin, and, grasping the wrist of this hand by the other, downward traction in the axis of the pelvic outlet may suffice to bring the breech down. Should these manipulations fail, then the only resource is the forceps to the breech, applied as is indicated in "Obstetric Surgery."

During traction incidental to all these manipulations it is necessary that the uterus should be followed down well, otherwise the arms will extend over the head or the chin will extend, thus complicating the delivery of the after-coming head.

Of course, if extension of the legs along the ventral surface of the fœtus is diagnosticated before engagement, the proper course to pursue is to insert the hand and to bring down a foot whilst the manipulation is comparatively easy. This subjects the fœtus to risk, however, since then the cord may prolapse, but it is a question simply of choice between two evils, and the lesser consists in the manipulation just described.

In case of presentation of the pelvic extremity, when the trunk of the fœtus has been delivered, if the arms have been allowed to extend above the head, these must be delivered before the head can be extracted. The difficulties are great, and the life of the fœtus is very much compromised. It is necessary to insert the hand practically to the fundus and, by a mechanism of flexion, bring down first one arm and then the other. The umbilical cord, if not already subject to pressure, will certainly be during these manipulations, and there is, further, considerable risk of the uterine rupture should the lower uterine segment be thinned out. Where the fœtal pulse-beat in the cord has ceased it is useless to subject the woman to the accompanying risks of extraction of the fœtus, but perforation of the after-coming head had better be immediately resorted to. Occasionally, after delivery of the trunk, the lower uterine segment closes down on the neck of the fœtus, and then delivery of a living child is impracticable, unless the attendant instantly incises the cervix in order to release the neck. This procedure is one of great risk to the woman. It is difficult to make the requisite incisions, since the trunk of the fœtus is in the way of the necessary manipulations; and, again, owing to the fact that the muscular fibres are closely applied to the fœtal neck, it is a difficult matter to insert the scissors. The incisions, further, cannot be limited as we would desire. In case they extend into the lower uterine segment they may involve the broad ligament and give rise to extensive hæmorrhage into the subperitoneal tissue. In view of these facts, in case, under deep surgical anæsthesia, the spasm does not yield, it is wise to elect perforation of the after-coming head.

As was noted to be the case in presentations of the vertex, we may meet with what are termed deviated presentations of the breech. In such cases the sacrum or the hip offers at the superior strait, when, unless the position be rectified manually, the fœtus cannot engage and descend. As a rule, the necessary rectification will entail the insertion of the hand and the bringing down of a foot, when labor is completed, as is the case in a primary presentation of the foot.

PRESENTATIONS OF THE TRUNK.

We have seen that, through spontaneous evolution, a transverse presentation may be delivered under the natural mechanism. Such an event, however, should never be anticipated. As soon as recognized, a transverse presentation should be converted into a presentation of the pelvic or of the cephalic pole. Before labor external version will accomplish this, although the vicious presentation is very likely to recur. If the transformation into a vertex presentation is accomplished before the onset of labor, a firm bandage should be applied with pads at opposed sides of the abdomen above and below, the object being to prevent the breech from descending and the vertex from rising. Notwithstanding these precautionary measures, the transverse presentation may recur, and then, in addition to the pads, it may be necessary to keep the woman in bed, lying as much as possible on the side opposed to the breech.

If the presentation of the trunk be not recognized until labor has set in, then precautions should be taken to keep the membranes intact until the cervix is dilated or is dilatable, when, under anæsthesia, podalic version should be resorted to. Where the presentation is not recognized until after rupture of the membranes, then, if the shoulder has not engaged deeply, it may still be possible, under the relaxation secured through the administration of ether, to push up the shoulder and to bring down the foot; but, if the uterus is firmly contracted around the body of the fœtus and the engagement is deep, then, instead of endeavoring to perform a forced version with the accompanying risk of rupture of the uterus, decapitation should be elected, unless the woman, in full view of the greater risk to herself, should elect the Cæsarean section. This major operation will be always contra-indicated, however, if the mother's condition be not good or if there is evidence of exhaustion of the fœtus.

In the rare instances where spontaneous evolution occurs the duty of the physician is purely passive, watching the woman for evidences of exhaustion. Exceptionally, even after impaction of the shoulder, it may be possible to cause spontaneous version to occur. This will only be the case, however, where the fœtus is small in comparison with the pelvis, or the reverse. Then, by replacing the prolapsed arm and by pressing on the shoulder, *sometimes* the one or the other pole of the fœtus will present instead, and the labor is terminated by nature or by art, according to the condition of the maternal vital forces.

MULTIPLE PREGNANCIES.

Although a woman may deliver herself of two or more fœtuses without the intervention of the physician, still, since the course of labor is apt to be complicated at one or another stage, it seems wise to discuss the subject of multiple pregnancy in this chapter.

Three reasons are offered for the occurrence of multiple pregnancy: either two Graafian follicles are fecundated at the same time and develop concomitantly, with the result that two fœtuses are delivered; or a single follicle contains two ova which are fecundated at the same time; or a single follicle contains two nuclei.

An outcome of these possibilities is the fact that two ova shed at the same time may be fecundated at different periods by the same or by different persons, giving rise to what is termed superfecundation; or, again, two ova shed at different times are fecundated at intervals more or less prolonged. This latter occurrence is termed superfœtation. Superfecundation has been proved possible by the delivery of women at term of fœtuses of different color, the result of the women having sexual commerce with a white man and a negro at periods not far removed. Superfœtation, on the other hand, is not so easy of explanation. This occurrence necessitates that after the first fœtus has attained a certain degree of development a second ovum becomes fecundated and finds lodgment in the uterus. It is very difficult to believe that the male sexual elements can gain access to an ovum when the cavity of the uterus is occupied by another impregnated a number of weeks previously. It must be remembered, however, that up to the third month of gestation the two deciduæ are not opposed so as to forbid access of the spermatozoa to the uterine cavity; and it must be still further borne in mind that ovulation possibly continues throughout gestation, even as it does throughout lactation, when, similarly, what is considered the outward manifestation of the process—menstruation—is absent. Therefore, the possibility of superfœtation cannot be denied, although we are justified in being very skeptical in reference thereto. The result of the manner in which the ova are shed gives a different arrangement of the twins in the uterus, and with this we are chiefly concerned.

Where the two ova which are shed come from separate Graafian follicles, each has its own membranes, and, therefore, there are two separate amnions and two chorions. There are also two placentæ, although the separation between the two may only be determined on careful examination, the partition between them being membranous and the apposition of the two being close.

Where the fœtuses are formed from the fecundation of two ova in a single Graafian follicle, we still find two amnions, but only a single chorion. The placentæ are separate, but there is close union between the two and free anastomosis of the vessels.

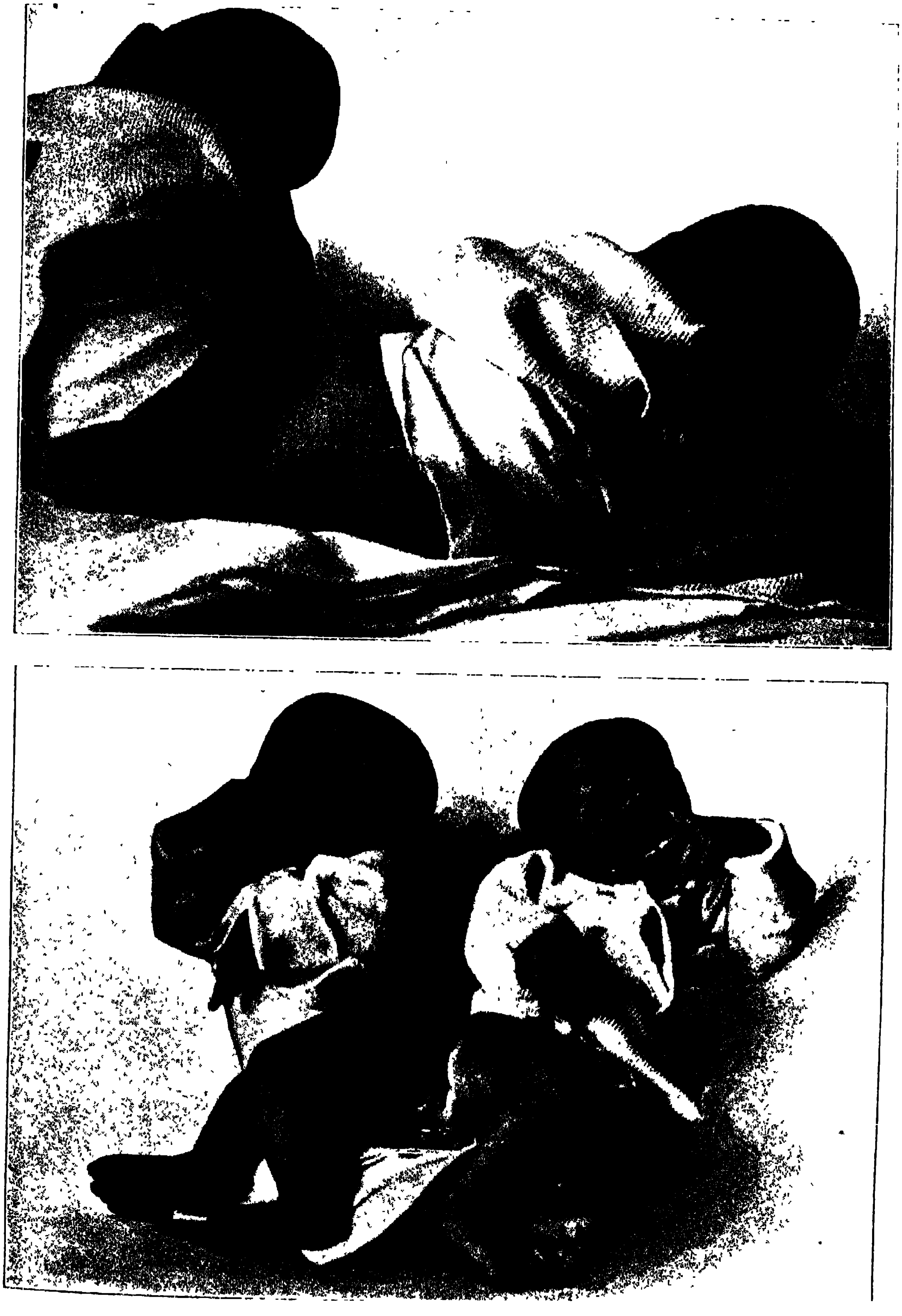
If the twins result from the fecundation of one ovum containing two centres of development, then we find a single amnion and chorion and placenta, the twins floating in the same sac and having a similar blood-circulation.

On the arrangement of the fœtuses, according to the fashion after which they have developed, depends many of the difficulties which are offered in the delivery of twin gestations. Thus, it is at once apparent that where the fœtuses occupy separate sacs the birth of one is not as apt to be interfered with by the other as where they occupy the same sac.

Usually the combined weight of the fœtuses exceeds that of a single fœtus, but not uncommonly one fœtus seems to be developed at the expense of the other, leading to the suggestion of immaturity. At times, one fœtus dies during gestation, either from lack of proper blood-supply, or, what really amounts to the same thing, through compression exercised by one fœtus on the other. Where the fœtuses occupy a common sac the cord of one may become entangled around the neck of the other, the result being that through tightening of the cord this fœtus is killed. At times, in twin pregnancy, one fœtus is born perfect in development whilst the other is imperfect, possibly to such a degree as to constitute a monstrosity. Again, where the fœtuses occupy a single sac fusion may occur at one or another part, giving rise to a species of monstrosity known as joined twins. The junction may be at the head, or sternum, or back, or at the pelvis, an interesting example of the latter which we have seen being figured in Plate XXXI. Again, one fœtus may be included in the other,—so-called cases of fœtal inclusion. Details in reference to these cases of monstrosity will be found in works devoted to the subject.

The diagnosis of multiple pregnancy is by no means a simple matter; indeed, in the average case only a presumptive diagnosis may be reached. The excessive size of the abdomen, where this is

PLATE XXXI.



Pygopagus (Tynberg).

a factor, may be present in cases where there is simply an excess of liquor amnii. In case hydramnion complicates twin gestation, the diagnosis is concomitantly more difficult, owing to the greater difficutly of making abdominal palpation. Where, on auscultation, two fœtal hearts are heard beating with separate rhythm and with maximum intensity at different parts of the abdomen, particularly when such data are established by separate observers, then there is a reasonably strong presumption of multiple gestation. If, in addition, on palpation two heads are felt or two pelvic extremities, then this presumption is strengthened.

As a rule, in cases of twin gestation, the tension of the abdominal walls is greater, owing to the greater distension of the uterus. This, however, is purely a relative phenomenon, since the same condition accompanies cases of hydramnion. Late in pregnancy we are apt to find suprapubic œdema and also a transverse depression just above the pubes. The same signs, however, may, again, accompany instances of excessive amount of liquor amnii. Where, on vaginal examination, the head is found presenting and yet at the upper uterine segment a head is felt, or if a second head is determined in one or the other lateral uterine walls, then the diagnosis of twin gestation is certified. As a rule, however, the only positive sign of value is the hearing of two fœtal hearts differing in rhythm and in location of maximum intensity.

Labor in case of multiple gestation is apt to be prolonged, since the woman has to undergo the process twice, as it were. The third stage is apt to be complicated by hæmorrhage, since, owing to the excessive uterine distension, uterine atony is a common sequence. The labor itself will rarely offer difficulties unless one fœtus interferes with the execution, by the other, of the requisite mechanism. The fœtuses may present in any possible way. Thus, they may both offer by the heads or the pelvic extremities, or one may present by the breech and the other by the head, or one may offer by the head or the pelvic extremity and the other be transverse. Where the fœtuses occupy separate sacs interference is less likely than when they lie in a single sac. After one fœtus has been delivered there occurs a pause and then the uterine contractions start in again, the second amniotic sac ruptures and the second fœtus is born. It must never be forgotten that even though there exist two placentæ the anastomosis between the two may be partial or complete, and that, therefore, if on the delivery of one fœtus the cord be not tied toward the maternal as well as toward the fœtal surface hæmorrhage will kill the second fœtus. Where after the delivery of one fœtus there is sign of impending maternal exhaustion we should not await the onset of the second labor, but, dilatation having been effected, the twin should be delivered by forceps or by version, according to the degree of engagement, and after the manner laid down in the portion of this work dealing with the surgery of obstetrics. We should always bear in mind the danger of uterine atony and consequent hæmorrhage and be prepared to tampon the uterine cavity in case the milder means for causing uterine contraction do not speedily suffice.

Where the fœtuses occupy a common sac one twin may descend by the head or the breech and occupy the pelvic inlet with the first fœtus. This is alone possible, of course, where the pelvic inlet is excessively large compared with the bulk of the fœtuses, or the reverse. In such an event we have an impaction, and, in order to effect delivery, it may be necessary to sacrifice one or the other fœtus in order to give the other an opportunity to be born alive. Where the head of the second fœtus engages in advance of that of the first we have a complication known as locked twins, and here, in order to deliver at all, it becomes necessary to decapitate one before the other can be delivered.

Transverse presentations are not uncommonly met with in case of multiple gestation, a point to be remembered, because, on the birth of the first fœtus, if the other occupy the transverse diameter immediate delivery by version is called for before we obtain an impacted shoulder. The occurrence of spontaneous version or evolution should never be awaited.

The statements we have made in reference to twin gestation apply with equal force to instances of triplets, or quadruplets, etc.

Triplets occur about once in eight thousand deliveries; quadruplets and quintuplets are of excessive rarity, although a number of authentic cases have been recorded. Obviously, the difficulties which delivery may offer are intensified by the number of fœtuses present. If the physician will only bear in mind the fact that it may become necessary to interfere in the interest of the fœtuses or of the woman, and that the danger of hæmorrhage from atony of the uterus is greater than in case of single gestation, he will be ready to meet the exigencies of the individual case as they offer.

INVERSION OF THE UTERUS.

An occurrence which renders labor abnormal, and which remains to be referred to, is inversion of the uterus, and this constitutes a most serious complication. The causes, in general, are atony of the organ associated with irregular contraction at the fundus, or a possible cause is attempt to deliver the placenta by traction on the cord. This factor will hardly be efficient unless there is associated atony, with the tendency to contraction of the upper uterine segment. As a rule, traction on the cord if the placenta does not appear will result in rupture of the cord.

Inversion of the uterus may be partial or complete. One or another horn may appear or the entire organ may turn inside out and emerge at the vulva. The uterus being atonic, the blood is pouring out of the uterine sinuses and the condition of the woman may become most critical. Reposition may be most easy and again most difficult. Where difficulty arises it is due to the fact that the inverted lower uterine segment, which now lies above, contracts down and offers a barrier to reposition. If the inversion can be promptly rectified by pushing up one horn and then the other, and finally the centre of the uterus, it must be remembered that the tendency to recurrence is very great, and, therefore, the physician should remain by his patient until, through the administration of ergot and of strychnia, he is satisfied that the organ has regained tone and will remain contracted. In case spasm of the lower uterine segment occurs, preventing reposition, then, under ether anæsthesia, the spasm may yield and reposition be possible. If this fail we would advise a waiting policy unless the woman is losing much blood, since the spasm may yield after an interval. In case the hæmorrhage is free the attempt may be made to check it by the firm tamponade with sterile gauze held in place by a bandage, bringing to bear compression, as it were, although under the given conditions this will prove very difficult. Should this attempt fail, before the woman becomes exsanguinated the sole resource—desperate as it is—is to open the abdomen and stretch the contraction ring. It has become a choice between two evils,—allowing the woman to bleed to death and subjecting her to the risk of sloughing of the imprisoned portion of the uterus, or resorting to the major operation for the release of the spasm. The manipulation which this complication requires must be characterized by the most absolute asepsis, else the woman will be infected.

Washing the Eyes of the Fœtus Immediately After Delivery

CHAPTER VIII.

CARE OF THE NEWBORN INFANT.

The fœtus having been separated from its mother through ligation of the umbilical cord, the first care requisite is attention to the eyes. Even before the cord is tied, where the exigencies of the individual case do not call for immediate ligation, the eyes should be washed. The average fœtus comes into the world with its eyes coated with the vernix caseosa, and, although in a case where the woman is free from infectious taint this cannot affect the eyes injuriously, seeing that in no given case are we in a position to certify that our technique has been absolutely aseptic, care in the early cleansing of the eyes is called for. (Plate XXXII.) The vast proportion of cases of ophthalmia may be traced to infection whilst the child is emerging from the genital canal, or even whilst it is in the canal, since, once the membranes ruptured, the eyes may readily come in contact with infectious material. The method of caring for the eyes will vary according as we are satisfied or not that the woman is free from specific taint. If she give no history of precedent vaginal discharge or if she is in that walk of life where gonorrhœal virus is not so apt to exist,—although such inference is never safe, since, whilst we may feel quite sure of the woman we can never have the same degree of confidence in the purity of the male,—then the following procedure is ample. With aseptic hands the physician or the nurse wipes off the eyelids with a piece of sterile gauze or cotton soaked in a saturated solution of boric acid, and, this accomplished, the eyelids are opened by the thumb and index of one hand, whilst the conjunctival surface is carefully cleansed by irrigation with the same solution. If the palpebral surface of the lids is covered with the vernix caseosa, then the physician should evert the lids and wash this surface off. We lay stress on the careful asepsis which should be associated with this manipulation, because eyes otherwise not infected may become so if our technique is at fault, and this may mean irreparable damage. The same care should be associated with the washing of the eyes thereafter, although, unless symptoms develop, it is not necessary afterward to do more than wash carefully the external surface of the eyelids. Since these principles have been introduced into obstetrics it has become exceptional to meet with cases of even mild ophthalmia.

In the event of there being a suspicion of gonorrhœal infection, it is not sufficient to use boric acid. Opposed, as we are, to the routine adoption of Credé's method of instillation of silver-nitrate solution, we are firmly convinced that its adoption in every suspicious case has been the cause of the infrequent occurrence of aggravated ophthalmia with its awful sequelæ. We look upon it as little short of barbarous to instill the silver solution unnecessarily into the eyes, whilst we realize to the full the great value of the method in aborting a possible virulent ophthalmia or in modifying its course.

Where there is a suspicion of possible infection, the eyes are first carefully washed with boric-acid solution, and then the eyelids are everted by the physician,—for the nurse, unless specifically trained, is not competent,—and 2 drops of a 2-per-cent. solution of nitrate of silver is instilled, care being taken that the solution comes in contact with the conjunctival surface of the eyelids as well as of the eyeball. Too much stress cannot be laid on this point. If this precaution be neglected, then our technique is imperfect and ophthalmia may develop. The *rationale* of the method depends on the determined ability of silver nitrate of killing the infectious elements,—the gonococci of Neisser. After a minute or two the excess of nitrate of silver is washed off and neutralized by instilling a solution of sterile 2-per-cent. salt. As a result of this instillation of the nitrate of silver a traumatic inflammation is induced, which leads to congestion of the conjunctiva and more or less swelling of the eyelids, but these symptoms should abate in the course of twenty-four hours, and it is unnecessary to repeat the process

Where the eyes have not been carefully washed or where they become infected notwithstanding the care taken, then we have to face an ophthalmia which will run a mild or a severe course, according to the degree of infection and also according to the measures resorted to for treatment. In case of the development of an ophthalmia, the severest oversight is necessary to avoid the complications, —ulceration, perforation, and permanent blindness.

If, in the course of twenty-four to thirty-six hours after delivery, the eyes, or one alone, begin to secrete a muco-purulent matter, then the instillation of nitrate of silver should be repeated, and, as soon as there appears chemosis or swelling, ice-pads should be kept over the eyes constantly. A convenient method of doing this is to place a number of thin pledgets of absorbent cotton on a block of ice and to instruct the nurse to apply them over the eyes frequently. In case only one eye is affected, great care is requisite to avoid infection of the other. The nurse should never touch the other eye without first carefully sterilizing her hands, and all cloths or cotton used for the infected eye should at once be destroyed, to avoid the possibility of their being used for the non-infected eye. When the physician lives in a city where he can obtain the services of an ophthalmologist, it will be wise to turn the infant over to his care. In remote country-districts, however, this will not be possible, and the points to be borne in mind are those on which we have laid stress, and, further, that, as soon as the swelling of the eyes begins to disappear, the time has come to discontinue the use of the ice. It is not possible to lay down definite rules for the frequency with which silver nitrate should be instilled, since there is difference of opinion among the expert. Our impression is that, after thirty-six hours, repetition of the silver solution is uncalled for, except where microscopical examination of the secretions shows that the gonococci are still present. As long as they exist the silver solution is indicated, and no longer. As soon as it is possible to dispense with the silver solution, either a saturated solution of boric acid should be used or else a sterilized 2-per-cent. solution of common salt.

During the few days following the birth of the child the most rigid precautions as to cleanliness of the eyes should be enforced, since, at this time, they are unable to resist infection as they are, to a better degree, later, and on these precautions the sight of the infant depends.

The eyes having been attended to, the next step is to bathe the child. From the start the infant should be accustomed to its altered surroundings, and the greatest of all mistakes is to coddle it. As it is started so it is apt to progress through life. It can best resist the effect of changes in temperature if it become accustomed to such changes. The infant who is looked upon even as a fragile china doll would be, will not grow up with the sturdy constitution and the resisting power which is so essential to healthy manhood and womanhood. The bath of the infant, therefore, should approximate in temperature that of its external surroundings. What should be aimed at is the avoidance of chill. The temperature of the bath, therefore, should be only slightly in excess of that of the room in which it is bathed. As a rule, a temperature of 80° to 90° F. should be selected, except in the case of immature infants, when, since we are not dealing with an individual of normal capacity, we must make the circumstances meet the case. The first step is to remove the coating of vernix caseosa and of blood with which the infant is covered to a greater or less degree. This is accomplished by greasing its surface with some unctuous material, such as sweet-oil or vaselin, the precaution being taken not to allow any of the material to get into the eyes or the stump of the cord, since it is not sterile. This greasing accomplished, the infant is supported on the hands of the nurse and placed in the bath so that the entire surface is covered with the exception of the head. It is then soaped and washed until the surface of the body has been cleansed, when it is removed from the bath and thoroughly dried. The flexures of the body are then covered with vaselin or a pure rice- or bismuth-powder, to avoid chafing of the delicate integument, and next the body is examined for defects. The natural openings are investigated in turn and the toes and the fingers are counted, since one of

PLATE XXXIII.

The Dressing of the Umbilical Cord

the first questions of the anxious relatives will be as to whether the child is perfect or not. If any imperfections are determined it is wise not to tell the mother, since the nervous anxiety she would be subject to would complicate her convalescence; but the father or some relative should be told, and, in case of such a complication as imperforate anus or urethra, steps requisite for giving speedy surgical aid should be taken.

The cord should now be dressed. (Plate XXXIII.) This matter is usually left to the nurse, but it falls within the province of the physician, since infection at the site of the umbilicus is a frequent cause of sepsis of the newborn. We are dealing with a wounded surface and the attention requisite is similar to that which any wounded surface demands; that is to say, asepsis is a *sine quâ non.* A pledget of sterile absorbent cotton or of gauze is wound around the cord, and this is left in place until the cord drops, varying from the seventh to the tenth day. During this interval the child should not receive a full bath, since our aim is to have the cord undergo dry gangrene after an aseptic fashion, and this is interfered with if the dressed cord is wetted, aside from the danger of infection with each manipulation.

If the cord has been properly tied there is little danger of secondary hæmorrhage except in case of hæmophilia; still it is a wise precaution for the physician to investigate the dressing at his first visit after delivery, in order to satisfy himself that there has been no bleeding. In the event of hæmorrhage if the first ligature has been applied as it should be, at a sufficient distance from the body of the child to admit of the application of a second ligature, it may prove an easy matter to arrest the hæmorrhage; otherwise, without trusting to the possible action of astringents, transfixion of the base of the umbilicus should be resorted to. In this connection we would note that a most valuable hæmostatic for oozing from the cord is offered by antipyrin applied in powdered form. Possibly any of the coal-tar derivatives will answer as well.

After the cord has separated it should still be treated as a wounded surface would be; that is to say, according to aseptic principles. It should be kept dusted with bismuth-powder and a firm pad applied over it until cicatrization has become firm, in order to avoid the possibility of umbilical hernia.

The child should now be dressed. All that we, as physicians, can do is to suggest forcibly the desirability of the infant not being clothed too warmly. Excessive weight should be avoided, and yet the infant should be sufficiently clothed to avoid chill. The nurse should be instructed never to cover the head of the infant, all that is really needed being to see that it does not lie in a current of air.

After the woman has rested for an interval after delivery, it is advisable to apply the child to the breasts for the triple purpose of accustoming the nipples to lactation; of giving the child the colostrum in the breast, which is nature's castor-oil, so to speak; and, finally, for the purpose of obtaining the reflex effect of irritation of the mammary glands on the uterus, which conserves the desired firm contractions of that organ.

Before applying the child to the breast, and this rule holds for every nursing, the mouth should be washed out with a saturated boric-acid solution, and the nipples should be similarly treated before and after nursing. These precautions are essential in order to avoid infection of the nipple, which is the cause of abscess of the mammary gland.

During the first few days of the infant's life it requires, besides the colostrum which it obtains from the mother's breast, only an abundant supply of water. This infant has come from the uterus, where it knew nothing about catnip-tea and sugar and milk and water; it enters the world with its intestinal canal filled with the liquor amnii and possibly meconium, and before its stomach is ready to assimilate food these waste products must be eliminated. The colostrum does this, and on or about the third day, when, as a rule, the milk appears in the breasts, the infant is prepared to receive it and to assimilate it. At intervals of about four to five hours prior to the advent of the milk the child should be applied to the breasts, the nipples thus becoming accustomed to traction and the child to receiving its supply of colostrum. On the appearance of the milk the average infant should be put to the breasts at intervals of two to two and one-half hours, and this routine should be the rule up to the third month, when the intervals between the nursings should be lengthened to three hours. It is impossible to rear every baby according to a fixed routine, since the gastric capacity and the functional activity of one necessarily differs from that of another. It has been proven that the rules we have laid down as to frequency of nursing are applicable to the average infant, and, according as they are followed or not, so will the child start in life with good or bad digestive tract. Overfeeding is as bad as underfeeding. Each child must be judged by itself, and it will require a week or two to find out just what the individual infant needs and can digest. During the intervals between the nursings the child should be given boiled, cooled water to drink, and then, if it be healthy and not chafed and the mother affords it a sufficiency of milk, both in quantity and quality, the early days of the infant are spent in sleeping and in feeding.

An infant can be trained from the start even as can a puppy. If it be accustomed to being rocked and walked the floor with and overfed, so must the parents continue or else have a struggle for the mastery. If from the start regularity of habit be followed, then the nursing mother will secure needed rest at night and the healthy infant will remain so. For the first few months of its existence it will be nursed about seven to nine times in the twenty-four hours, at intervals of two to two and one-half hours during the day and at from four- to five- hour intervals during the night. The child should be weighed every ten days to a fortnight, and so long as it is gaining in weight it is thriving, even though it occasionally suffers from colic or has, at times, stools of a green or slimy character. Frequent feeding or, rather, overfeeding will be found to be at the bottom of green stools or colic, where the maternal milk is of proper quality, and the administration of a teaspoonful of lime-water, for a few doses, before the application of the child to the breast will correct the hyperacidity of the stools and the fermentation, or else an enema of soap-suds and warm water will do so by clearing the undigested milk from the intestinal canal. These milder measures should always be tested before resort to the administration of drugs. The more common sense is utilized in the rearing of the infant, the less will it be requisite to resort to drugs.

Regularity in nursing, sleep, bathing, and a sufficiency of fresh air and water are the keystones which lead to the development of the healthy child.

Thus far we have traced the care which should be given to the infant born at term and in sound condition.

Premature infants demand special attention. The child born at the thirty-fourth to the thirty-sixth week does not as readily accommodate itself to its surroundings. Its organs are not developed to the requisite degree, and we must lend it artificial aid. Thus, it must be clothed more warmly, and this is accomplished by wrapping it in cotton and surrounding it with hot-water bottles, or, in case of prematurity to the extent of six weeks before term, it should be placed in an incubator such as is described in the surgical portion of this work. If such an apparatus be not obtainable one may readily be improvised. Often the premature infant has not the power to exert sufficient suction to empty its mother's breast, and if we do not come to its aid it drifts rapidly into a condition of inanition. Obviously, as the maternal milk is the best food for the infant at term, it becomes all the more so where the child is immature. The woman's breasts should, therefore, be milked out by hand and the child fed with it by means of an ordinary medicine-dropper. Absolute cleanliness should characterize this process, in order that the milk should reach the infant in as sterile a condition as it exudes from the breasts. The immature infant, further, requires feeding at more frequent intervals than does the mature, since, its gastric capacity and function being less, it cannot obtain the requisite amount of nourishment in the same interval of time as can the mature child. Possibly we can supplement the food of such an infant by having its body anointed a number of times a day with sweet- or codliver- oil.

As far as the infant is concerned, the great emergency which offers is *asphyxia*. We distinguish two types,—the anæmic form of asphyxia and the congestive or apoplectic form.

The causes of asphyxia, in general, are dependent on conditions of the woman and on the placenta or the cord. The anæmic form results from insufficient nourishment dependent on disease of the placenta or on compression or twist in the cord. Thus, the anæmic type results from the fact that the infant either receives a deficient supply of oxygenated blood or else the condition of the woman is such that she is unable to give the infant the oxygen which it needs. Antepartum hæmorrhage, for instance, associated usually with placenta prævia, is one cause of the anæmic type of asphyxia, for the reason that the woman loses so much blood that what she furnishes the fœtus is of poor quality. Disease of the placenta interferes with the infant receiving the oxygen which it needs, seing that the circulation through this organ is impeded. Obviously, where the cord is twisted or compressed the fœtus suffers from lack of blood.

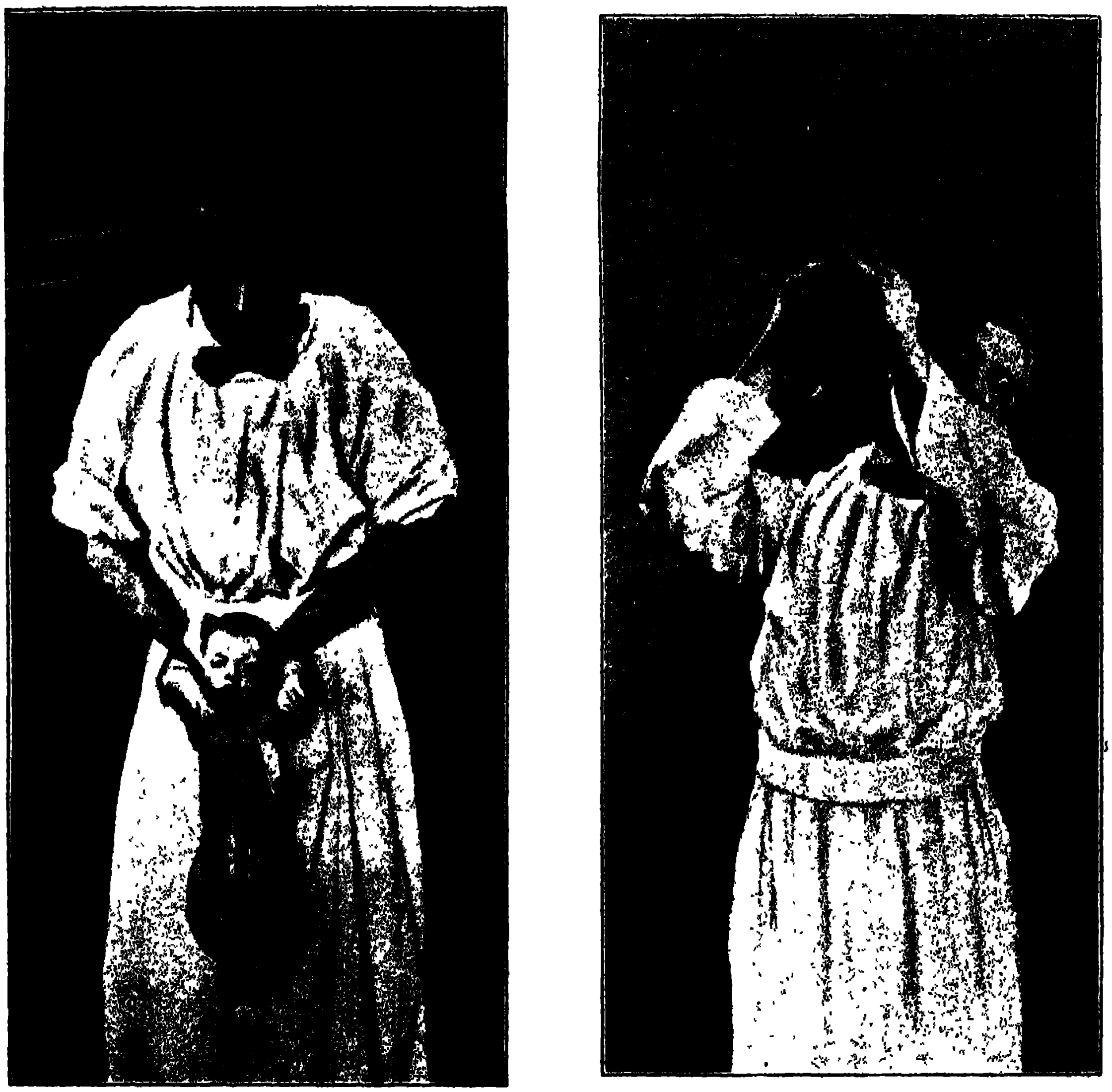
The apoplectic form of asphyxia, on the other hand, usually follows protracted labor or conditions which have resulted in spasm, to a greater or less degree, of the uterus during the second stage. In this form the fœtus receives a sufficient supply of blood, but it is again improperly oxygenated, becomes venous in quality, and there results congestion.

In the anæmic form the infant is born pale and limp, the surface being cold and the muscular system flaccid. The sphincters are relaxed; the heart-beats are faint and rapid or imperceptible. The pulsation in the cord is similarly faint or imperceptible. Respiration is absent altogether or gasping at long intervals. The picture is one of acute shock from loss of blood. In the apoplectic form, on the other hand, the surface is congested; the muscular system approaches rigidity; the pulsations of the heart are slow and labored; it may be possible to excite reflex movements in the fœtus; respiration is slow and labored.

Either of these types of asphyxia may be so profound as to simulate death, and yet, in every case, the methods of resuscitation should be faithfully tested, since there are many cases on record where, through perseverance, even a forlorn hope has resulted in a victory. Where the diagnosis of the form of asphyxia is made prior to the cutting of the cord, it is advisable not to tie in the anæmic form so long as it is possible for the woman to furnish the infant with blood; that is to say, tying should be delayed for a number of minutes. In the apoplectic form, on the other hand, it is wise to allow the cord to bleed, thus in a measure relieving local congestion. During these procedures the mouth and nose and pharyngeal vault should be cleared of mucus and liquor amnii by inserting the finger, covered by a piece of muslin, into the mouth and a cotton-wrapped probe into the nostrils. If there is valid ground for thinking that much liquor amnii and vaginal mucus has entered the trachea, then a catheter should be passed into the trachea and suction be exerted. As a rule, however, this will not be requisite, since either of the methods of artificial respiration we shall shortly describe causes the expulsion of detritus from the trachea and upper bronchi.

The mouth and the nostrils having been cleansed, a piece of muslin should be applied over the infant's mouth, and, whilst its nostrils are being compressed, the physician should apply his mouth over the child's and slowly breathe into it, then depress the infant's thorax and again breathe in. This mouth-to-mouth insufflation we much prefer to attempts at insufflation by means of the catheter, and often, if persisted in, we shall be able to resuscitate the infant in this way alone, especially if we are dealing with the apoplectic type. If the type is anæmic, then we question if over-anxiety and resort to active measures do not kill many an infant. As we have stated, the anæmic infant is suffering from shock, and the measures which suggest themselves are similar to those we would resort to were we dealing with an adult. Heat to the surface, the injection into the rectum of a pint of hot (115° F.) saline (2 per cent.) solution, the instillation into the mouth of 10 drops or so of brandy,—such are the primary measures of utility. If we seize such an infant and plunge it into hot water and then apply ice to its surface and

PLATE XXXIV.



Schultze's Method of Artificial Respiration.

then spank it or hold its head down, exposed to the chill of the room, the chances are that we shall not be able to resuscitate it. Calm demeanor and absence of overhaste will do the child more good if the simple measures we have outlined are resorted to.

In case of an apoplectic infant we need not worry so much over attention to bodily warmth or stimulation. What this child needs is resort to measures which are going to cause it to breathe deeply, the result being relief of congestion through proper oxygenation of the blood, and, in consequence, vigorous heart-action, since, concomitantly, the venous engorgement of this organ is relieved. Here then, after cleansing the mouth and the nostrils, it is well to resort to one or another of the methods of artificial respiration.

The two methods of artificial respiration with which the student should familiarize himself are the Schultze and the Byrd, the latter having been of late years resuscitated and advocated by Dew; and we therefore prefer to give it the name of the Byrd-Dew method, since Dew unquestionably independently systematized the method which Harvey Byrd, of Baltimore, described a quarter of a century ago.

Schultze's method is well represented in the accompanying plate (Plate XXXIV). It aims at producing alternate expansion and compression of the thoracic walls, thus imitating nature's respiratory acts. Further, the descent of the diaphragm is favored and the necessary associated compression of the abdominal walls drives the diaphragm upward in the expiratory act, and thus the lungs are alternately expanded and compressed. The child is grasped just below the neck, the fingers resting on the dorsum and the thumbs on the thorax. The first motion is to hold the child downward and then the second motion is to swing the child upward and backward over the head, thus flexing the lower extremities on the abdomen. These alternating movements are repeated at intervals, and may be followed by the restoration of the function of respiration.

Practically, the Byrd-Dew method accomplishes the same effect as the Schultze, but it has the decided advantage that the steps of the method may be followed whilst the surface of the child is kept beneath hot water,—a necessary accompaniment in cases where we are dealing with the anæmic type of asphyxia or where the stimulus of heat to the body is otherwise desirable.

The infant is grasped with the left hand, with the neck resting between the thumb and forefinger, the head falling far over backward, the upper portion of the back and the scapulæ resting in the palm of the hand, the other fingers in the axilla lifting the arm upward and outward, and with the right hand grasping the knees (if the infant is small, the ankles) between the fingers, the thighs resting in the palm of the hand. (Plate XXXV.)

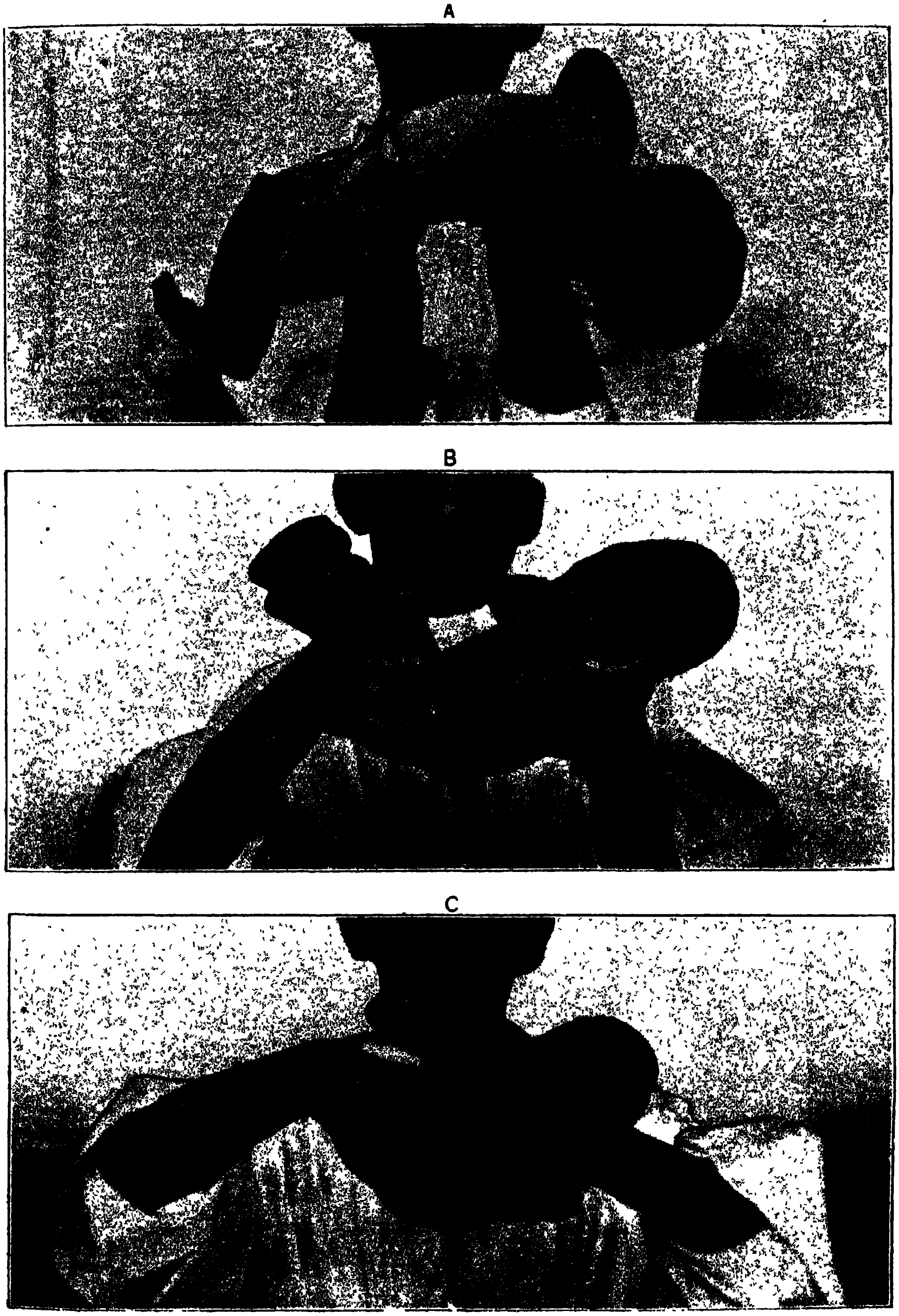
Then to induce inspiration depress the pelvis and lower extremities, allowing the abdominal organs to drag the diaphragm downward; and with the left hand gently flex the dorsum backward. This lifts and separates the ribs like the segments of a fan.

To excite expiration reverse the movement bringing the shoulders and chest forward, closing the ribs upon each other, and at the same moment bring forward the thighs, resting them upon the abdomen. This movement crowds together the contents of the thoracic and abdominal cavities, resulting in a most complete and forcible expiration, while, at the same time, it empties the great blood-vessels of their engorged venous supply and relieves the right heart. In short, not only is the following inspiratory act rendered more decided as a consequence of this perfect expiratory movement, but a distinct suction effect is excited, in a most beneficial way, on the thoracic circulation.

During these manipulations, which may be repeated from six to eight times a minute, the air may be heard entering the trachea during the inspiratory act, and on resorting to the expiratory movement not only is the air driven out, but also any mucus or liquor amnii which may have entered the air-passages.

One or the other of these methods, associated with mouth-to-mouth insufflation, will result in the resuscitation of the majority of infants who are suffering from the effects of the venous form of asphyxia. The methods are tedious, but they should be kept up so

PLATE XXXV.



The Byrd-Dew Method of Artificial Respiration.

A. Extension. B. Semi-flexion. C. Complete Flexion.

long as there is the slightest audible heart-beat. Of the two methods, the Byrd-Dew has answered best in our hands, for the reason that other restorative measures can be resorted to at one and the same time. The ordinary Marshall-Hall or the Sylvester method presents no advantage over those we have described; indeed, in infants, we question if they possess the same advantages that they do in adults.

A further method worthy of trial is the recently resuscitated one of promoting respiration by traction on the tongue. The tongue is grasped by a vulsellum forceps and, at intervals of three to six times to the minute, it is drawn outward and then allowed to return to its natural position in the mouth. This traction is supposed to set up reflex respiratory action, and may be stated as of value as an adjuvant to the Byrd-Dew method.

In case of the anæmic type of asphyxia, when the prognosis is always worse, the Sylvester method, with the infant's body held in a tub of warm water on the hands of the nurse, or else the Byrd-Dew method similarly applied, should be preferred. It must be remembered that, in this form of asphyxia, the surface of the body of the child must be kept warm, in order to enable it to emerge from the condition of acute shock, so to speak, in which it is.

PART III.—The Puerperal State.

THE NORMAL PUERPERIUM.

THE PATHOLOGICAL PUERPERIUM.

CHAPTER IX.

THE NORMAL PUERPERIUM.

The puerperal state can only be physiological where the woman is uninfluenced by other than natural environments. The Indian squaw, in the early history of this country, gave birth to her child without delaying her companions when on the march, and was able at once to join them in their journey. To-day we have to deal with an entirely different being. Woman has inherited from her ancestors a physical organism so far removed from that belonging to the savage that what was once a physiological act, pure and simple, now verges on the pathological. Indeed, it requires the astuteness of the careful physician to recognize deviations from what should be normal and yet what is too frequently pathological.

The puerperium comprises the period beginning with the end of the third stage of labor and terminating when the woman returns to her normal state of health. It is impossible to accurately define the length of time the puerperal state covers, since so many conditions influence this interval. The process of labor involves an enormous amount of muscular energy, loss of blood and strength, and therefore it is followed by exhaustion to a greater or less degree. The frequently necessary exposure of a portion of the body, together with the rapid evaporation of heat from portions which are wetted, results in loss of tone, which is manifested, often, by a sense of chilliness or even by a decided chill. This chill is, however, of no special significance, being unaccompanied by rise of temperature. The pulse, which during the act of labor has become accelerated, slows down and becomes regular, falling as low, frequently, as fifty beats to the minute. This is of good prognostic omen, and the careful physician will always watch his patient when the reverse holds true. Undue acceleration of pulse is an indication of impending hæmorrhage or of exhaustion.

In case the labor has been tedious we may witness, during the twelve hours following delivery, a rise of temperature to 100° F. After this period the temperature should not rise above 99° to 99.5° F. unless there be some complication impending or existing. Before the days of asepsis during labor and the puerperal state the physician rather expected a rise of temperature about the third or the fourth day. Indeed, this occurrence was so constant that it was ascribed to the filling of the breasts, and it received the name of "milk fever." To-day, however, where asepsis is carefully maintained this rise of temperature is not noticed except in instances where the intestinal tract is clogged, and then it is due to absorption of waste products. A laxative reduces the temperature to the normal.

Inability to empty the bladder is a frequent and annoying complication of the early puerperal state. This is often due to the fact that the woman is unable to empty her bladder in the recumbent position. Again, the œdema of the vestibule may partially occlude the calibre of the urethra and offer such an amount of obstruction that the somewhat paralyzed bladder cannot empty itself. The bladder should receive attention at least every eight hours, and where it is necessary to catheterize the nurse should be instructed to do so by sight after precedent asepsis of the vestibule.

Involution of the uterus begins coincidently with the process of labor. The firm contractions of the muscular fibres necessitate waste and at the same time the lessened blood-supply causes fatty degeneration to set in. Coincidently with this fatty degeneration new cells are being formed; that is to say, the degenerative and the regenerative processes go hand in hand. The uterus thus diminishes in size and its walls increase in density. It requires about two months for this process of regeneration to be accomplished, and yet the uterus never returns to the size it had before conception. It always remains larger and heavier except in those rare instances where excess of involution occurs.

Immediately following delivery the cervix is soft and its canal is patulous. It is difficult to define the margin of the cervix, it being apparently merged in the vaginal walls. Twenty-four hours after delivery the cervix becomes well defined, although the canal is still patulous. At the end of two weeks the cervix has regained much of its normal shape, the external os still admitting the tip of the finger, although the internal os should be closed. The original size and appearance of the cervix is never regained. The external os, instead of being round, presents a transverse slit, except in instances where it has been lacerated to a greater or a less degree and has not healed, in which case the appearance may be most varied according to the degree of laceration.

During the eighth month of pregnancy certain of the uterine sinuses become obliterated through the coagulation of the blood. After delivery the blood coagulates in the remaining sinuses. Their walls become thickened through the development of new connective tissue. This tissue contracts until the sinuses are completely obliterated. This process is necessarily gradual and the obliteration is not completed for some months after delivery.

After delivery the vagina is relaxed and the site of abrasions vary in depth and in distribution. In case laceration has not occurred, or where this has been immediately repaired, involution proceeds rapidly. The vagina, however, never returns to its original size. About six weeks are requisite for involution to be completed.

The repair of the uterine mucous membrane is coincident with involution. The superficial layer of the decidua is in great part detached with the membranes and the placenta. During the few days following delivery the attached fragments of the superficial layer are shed with the lochia. The shortening of the muscular fibres of the uterus forces the utricular glands into a more perpendicular direction and crowds them closely together. As occurs after a thorough curetting of the uterine cavity, the epithelium of the glands proliferates and soon lines the ducts and thence the uterine cavity. This process requires about six weeks for its completion.

The placental site is repaired more slowly than the remainder of the cavity.

For the first few days after the delivery the uterus undergoes contractions of a similar nature to those which assist in the expulsion of the fœtus, although far less intense, and these contractions are known as "after-pains." These pains occur in inverse ratio to the length of labor, and are therefore more frequent in multiparæ than in primiparæ. Their presence is salutary, since they insure the maintenance of firm contraction of the uterus. Where the uterus remains soft after delivery and fills with blood-clots these contractions are very troublesome and will call for alleviation. Either the triple bromides in 10-grain doses each will allay these after-pains, or chloral hydrate in 10-grain doses, repeated every two or three hours. Massage of the uterus, by causing it to contract and expel the accumulated clots, will check the pains.

The discharge from the vagina following labor is termed the "lochia." At the outset the lochia is red and is largely composed of blood. After a few hours, however, the discharge will contain fragments of the membranes and of the placental decidua, as also the secretion from the vagina and the cervix. During the first three days after delivery so much blood is present in the discharge that the term "rubra" is applied to the lochia. As the amount of blood diminishes and the serous element increases the lochia becomes pale red and the term "serosa" is applied to it. This color lasts until about the sixth day. The lochia then consists of serum containing fat-globules and exfoliated epithelium. The color becomes grayish white and the term "alba" is applied to it. At the outset the reaction of the lochia is alkaline, but during the second week it becomes neutral or acid.

The amount of lochia varies greatly in different women. Women who do not nurse their infant and those who normally menstruate freely will have a greater flow. The average quantity during the eight days following delivery has been estimated as being about three and one-fourth pounds, of which the lochia rubra is about two pounds.

Where strict asepsis is observed during the puerperal state the lochia should never have any odor except a slightly stale smell as the discharge decreases in amount.

After the completion of the third stage of labor the uterus can be felt as a hard, firm body through the abdominal wall. It is somewhat pyriform in shape and extends to a point a trifle above a line midway between the symphysis and the umbilicus. The organ is slightly anteflexed and measures about six inches in depth. It is about four and one-half inches in width. Where the rectum and the bladder are full the uterus may be deflected toward the right side and backward. During the twenty-four hours following delivery the uterus ordinarily markedly lessens in size. Relaxation during this period and consequent increase in size is frequently dependent on a full bladder. Involution of the uterus normally progresses so rapidly that about the tenth day the fundus will be found below the level of the symphysis.

From the very beginning of pregnancy the breasts undergo developmental changes which fit them for the secretion of milk. This process of change is gradual and progressive and becomes completed about the first week after delivery. It will be recalled that the breasts are glands of the compound-racemose variety. The gland-structure itself is covered by smooth, delicate skin, and underneath this is a layer of adipose tissue. The glandular structure consists of lobes, lobules, and acini. Canaliculi start from the acini and anastomose to form the canals of the lobules. These canals unite in turn to form a canal for each lobe, and this is termed the "lactiferous duct." The lactiferous ducts terminate in the nipple by small openings, about one-fortieth of an inch in diameter. As the duct passes downward from the nipple it enlarges into what is termed the sinus of the duct. The space between the lobes is filled in with adipose tissue and the whole structure is firmly held together by connective tissue.

The breasts enlarge and grow more firm during pregnancy, from the accumulation of fat between the lobules and the development of new acini. The fluid which is secreted before and during the first few days of the puerperium is known as colostrum. It contains fat, albumin, salts, sugar, water, and large bodies known as colostrum-corpuscles. These latter are derived from the disintegration of the epithelium which lines the acini. This colostrum has a laxative action, and cleanses the intestinal canal of the infant in order to prepare it for the milk, which is secreted about the third day. The early milk does not contain as large an amount of solids as the later, the fluid altering in density as the gastric capacity of the infant becomes better able to assimilate it.

The care which the newborn infant should receive has been dwelt upon in the chapter devoted to that subject. During the first four to six days of its existence the infant will decrease in weight, owing to the small amount of nourishment which it receives. This loss should be gradually recovered, the original weight being regained about the seventh to the ninth day after delivery. The infant's head gradually regains its shape, and the swelling of the presenting part subsides in a few days. At the end of two or three days exfoliation of the epithelium begins and continues for seven or eight days. During this period icterus not uncommonly sets in and, as a rule, passes off without remedy being indicated. In the event of its becoming deeper, then a mild laxative will assist in its disappearance where organic cause does not exist.

MANAGEMENT OF CONVALESCENCE.

Before leaving the woman, after delivery, the physician should carefully examine her. He should satisfy himself that the uterus has remained firmly contracted. He should look at the vulvar pad to see that the flow of blood is no more than what is natural. This is especially requisite, because, even though the uterus may be firmly contracted, hæmorrhage may be occurring from a lacerated cervix or from some portion of the vagina. He should note the condition of the pulse and respiration. A slow and regular pulse is what we should expect to find unless the woman is greatly exhausted or is losing an undue amount of blood.

The physician should remain by his patient for at least one hour after delivery. Before leaving, written directions should be given the nurse or attendant in regard to the method of controlling hæmorrhage should it occur. The woman should be allowed to rest quietly for a number of hours after delivery, and ordinarily she will sleep. After about four hours the infant should be applied to the breast. This causes contraction of the uterus and assists in maintaining the organ firm.

The diet of the lying-in woman should be bland for the first few days. Milk and light soups are preferable. After the bowels have been thoroughly cleansed and the milk is beginning to be secreted there is nothing gained by the starving process of the past; indeed, much is lost. The woman needs food not only for recuperative purposes, but also to enable her to stand the strain of lactation. Where the course of the puerperium is smooth solid food may be administered carefully after the second or the third day. The amount will vary according to the desire of the woman, and never to the exclusion of milk.

A laxative should be administered the evening of the second day, at least, since the puerperal state will progress to better advantage in case the intestines are kept unclogged. In case the woman is of the constipated type, this laxative should be given twenty-four hours after delivery. Whilst normal evacuations should be secured daily, hypercatharsis should be avoided except it be desired to diminish the flow of milk.

In case the woman finds it difficult to empty her bladder or her rectum in the recumbent posture she may be allowed to sit upon the bed-pan whenever there is no contra-indication from the side of the heart. The popular idea that the woman should maintain the recumbent posture for days after delivery is erroneous. It has been experimentally proven that, where the pulse is slow and regular, it does the woman no harm to begin to assume the semirecumbent posture within twenty-four hours after delivery. Involution progresses as normally and drainage is better. After the fourth day the woman will be able to assume this posture for the greater part of the day, and the result will be that, when the time arrives for her to leave her bed, she will be in better physical condition.

The consensus of opinion would seem to be that ergot should be administered as a routine measure for the week following delivery. The drug seems to favor involution and the uterus is certainly prevented thereby from relaxing. Thirty drops of the fluid extract may be ordered three times daily. A sixtieth of strychnia three times daily would appear to favor involution.

The physician should see his patient at least eight hours after delivery and should then note the state of the uterus, the amount of lochial discharge, and inquire as to whether the bladder has been emptied or not. For the three days after delivery it will be wise to see the woman, when possible, twice daily, since this is the period when untoward change is apt to occur. The temperature and the pulse should be taken morning and evening for the first week. The nurse or attendant should be instructed to exercise the most absolute cleanliness before touching the woman. She should be instructed to wash her hands and to dip them in a solution of bichloride of mercury 1 to 5000 before changing the vulvar pad and before washing the genitals. The old-fashioned napkins should not be allowed in the lying-in room. Absorbent cotton baked in the oven, or, in the households of the indigent, cloths boiled before use, should take their place. In the households of the well-to-do the sanitary napkins, which may now be obtained everywhere, should be used. They should also be baked in an oven before use. These pads should be changed as frequently as they become saturated. The external genitals should be bathed frequently, a solution of bichloride, 1 to 5000, being used, or a 1-per-cent. solution of creolin. Vaginal douches are never indicated in the normal puerperium; indeed, their routine administration adds to the danger of infecting the woman. The indication for the vaginal douche is odor to the lochia, which is possibly due to the decomposition of a clot in the vagina. In case the odor persists, then the indication becomes stringent to examine the woman carefully for the early detection of a beginning sapræmia. In case a vaginal douche seems indicated it should be administered with absolute asepsis, as is fully exemplified in the chapter dealing with obstetric asepsis (*vide* "Obstetric Surgery"). An intra-uterine douche should never be administered by the nurse or the attendant, but always by the physician, who alone is competent. The indication for such douche will, as a rule, be odor to the lochia which persists after vaginal douching.

The physician who is careful to persuade every healthy woman to nurse her child will do much toward lowering the mortality-rate of children under five years of age. The woman who is not willing to sacrifice social pleasures and personal comfort for the benefit of her child is unworthy to become a mother. Mothers' milk constitutes the natural food of the infant and nothing has been found which will in every respect take its place. Of course, where the maternal condition will not allow of lactation, either because of imperfect development of the mammæ or because of organic disease, the woman cannot properly nourish her offspring, in which case artificial means must be resorted to. When the woman suffers from the distension associated with an excess of milk the application to the breasts of hot cloths for ten minutes, and repeated at intervals, may relieve her; or, what is preferable, the nipples should be covered with a pledget of sterile gauze and a firm compression binder should be applied. The breasts will often thus empty themselves under this pressure. At the same time the amount of fluid taken by the woman should be diminished. In the event of there being an insufficient supply of milk or a diminution in the amount, a strong infusion of the milk-plant—the *Galega officinalis*—may be ordered in tablespoonful doses three to four times daily. At times there will result an increased supply.

The period when the woman should be allowed to leave her bed is very variable. As a rule, the uterus has involuted below the pelvic brim by the tenth day, and the woman may be allowed to leave the bed and to spend a portion of the day on a lounge. She should not be allowed to walk until the fourteenth day, and then after a gradual fashion. As long as the uterus has not involuted below the pelvic brim, in particular if the red lochia tend to recur on much exertion, it is wise to limit the exercise which the patient will take, and often it may be necessary to keep her in bed. It is the after-care which the woman receives which tends to allow the uterus to return to a fairly normal condition after labor, and which will do much toward the prevention of uterine diseases, in particular uterine displacements.

The resumption of sexual intercourse should not be permitted until after the second month, since the pelvic congestion which the act entails interferes with proper involution of the pelvic organs.

There remains to be considered the method of rearing the infant artificially in cases where, for one or another reason, the woman is unable to nurse. Unquestionably the milk of another woman is the ideal substitute, but in practice great difficulties are met. It has been truly said that the "model wet-nurse should be a woman of suitable age who has lost her own child at about the same age as the foster-child. She should have a breast of good and abundant milk; be free from actual or heredity predisposition to disease; possess a kindly disposition and an even temperament; have no vicious, gluttonous, lazy, or uncleanly habits; be animated by a love of children rather than the money-value of her services." If such a woman could be found, then unquestionably the best substitute for the woman herself would be the wet-nurse. But, unfortunately, the average woman to be secured is the very reverse. She enters the household and at once assumes that all should bow to her and be subservient to her wishes. She thinks that the parents of the infant will put up with all her whims and demands lest the infant suffer. She either drinks or develops a taste for liquor. As a rule, she is fonder of a lie than the truth, and if she does not neglect the baby she may drug it. Again, notwithstanding the most careful examination, hereditary or acquired disease, such as syphilis, may be the legacy she will leave the babe.

On the above and other grounds it will resolve itself into the physician prescribing some artificial food for the infant. There is no food which can take the place of milk, and that of an animal must be utilized. Cows' milk is universally obtainable. The milk of a cow, however, unmodified, is not fit for the newborn babe. It contains a greater proportion of casein than does woman's milk, and it coagulates in the stomach into dense curds which the infant's gastric juice cannot digest. It also contains a greater proportion of butter than human milk, and therefore fat-acids are almost certain to form, and this upsets the infant's digestion. Proper dilution with water, in a measure, renders cows' milk suitable for the average infant.

It is immaterial whether the milk is obtained from one or more cows, provided the animals are healthy. By obtaining the milk from a number of cows the average quality is more readily secured. The milk should be as fresh as possible and it should be sterilized at once by means of boiling, a sufficient quantity being prepared to suffice for twenty-four hours' feeding. The following formula for preparing milk for the infant will be found reliable: Dissolve 20 grains of French gelatin (this is about two inches) in half a pint of hot water. Add 1 teaspoonful of pulverized arrowroot and 5 grains of sugar of milk. Strain a half-pint of milk so as to distribute the cream evenly and add this to the mixture. Add one tablespoonful of cream in order to bring the amount of fat to the proper standard. The entire amount is well stirred and poured into a sufficient number of nursing-bottles to answer for the twenty-four hours' feeding. Place the bottles in a steam-sterilizer and heat to a temperature of 212° F. The bottles having been sealed with rubber stoppers, the milk will remain perfectly sweet. The child should be given a bottle every two hours, up to the age of three months, during the day-time. It will soon become accustomed to sleep from four to six hours during the night. In case the infant is constipated the amount of cream added is increased, and the reverse holds where the child has watery movements. A small pinch of salt should be added to each bottle. In case of acid fermentation a little bicarbonate of soda may be added.

Those who have the care of the infant must be impressed with the fact that, unless the bottles and the rubber nipples are kept perfectly clean, intestinal disturbance is sure to result. The bottles must be well scalded before filling with milk; the nipples should be inverted and scrubbed with a brush. When the nipples are not in use they should be kept in a solution of boric acid. The nurse should never be permitted to use anything except the plain nipple which fits directly over the bottle. No tube extending into the bottle should be allowed, since it is practically impossible to keep it clean. As soon as possible, the child should be trained to take its milk from a cup.

CHAPTER X.

THE PATHOLOGICAL PUERPERIUM.

THE boundary-line between the physiological and the pathological puerperiums is rarely sharply defined. It has been seen that, under normal conditions, the retrograde phenomena of the puerperal state are not constant in their course, largely because the woman never can approach labor in the *ideal* condition. We can hope, therefore, only to lay down approximate rules for the determination of the minor deviations from the physiological puerperium, laying stress on the fact that watchful care will rarely overlook excess in these boundary-line phenomena, since on early recognition and on prompt treatment will depend the aborting of major complications.

Prophylaxis, armed expectancy,—such should be the rôle and the attitude of the physician during the puerperal state.

The student who has been grounded, as he should be, in the young science of bacteriology will appreciate the fact that the study of the pathological puerperium may be much simplified. Even though as yet the foundation of our modern belief may be in minor details a trifle insecure, the keystone is well laid, and on this is inscribed the words "wound infection" as the definition of alteration of the physiological into the pathological. A possible exception is termed sapræmia, although it may eventually result in septicæmia, and, when traced to its source, this is found to be dependent on the development or on the result of the activity of pathogenic organisms. That is to say, sapræmia following decomposition through infection becomes in import the same septicæmia which follows wound infection.

The term "puerperal fever" may still suffice for the laity. It can have but one meaning for the physician, and this is septicæmia, blood-poisoning, wound infection, the absorption of products of decomposition altered through infection into a virulent poison.

Whence the infection?

Three possible sources have been described and each, in turn, has carried weight in the past in the nosology of so-called childbed fever. These sources are: the atmosphere; the body of the puerpera; material of an infectious nature, or capable of causing infection, brought in contact with the genital system of the puerpera (including under this term the mammary glands).

Reference to the first two possible sources may well be brief, since modern knowledge and belief have relegated them well nigh to the shelf of oblivion, where they rest as evidence of past erroneous teaching.

Atmospheric infection of the puerpera as a cause of septicæmia, whilst a comforting belief, since it casts the responsibility on nature, is not a tenable one. Given a puerpera delivered after an aseptic fashion and cared for similarly afterward, and she may lie in an infected room—whether the infection be erysipelas, measles, scarlet fever, etc.—and the puerperium may be unaffected so far as septicæmia is concerned. She may develop either of these acute infectious diseases, but they run their proper course, only modifying the puerperal state in so far as arrest of retrograde metamorphosis is concerned. If she die, the lesions peculiar to the intercurrent disease will be found. Aside from arrest of involution of the sexual organs, we may find nothing suggestive of septicæmia. On the other hand, as will be noted shortly, let the erysipelas or the scarlet-fever infection material be brought into direct contact with the wounded genitals of the puerpera and septicæmia may follow, modified or not by the development of the infectious disease from which the contact-virus emanated. If she die, the lesions due to infection—the lesions of septicæmia—will be found in addition to those peculiar to the intercurrent disease; for instance, scarlet fever or erysipelas *plus* septicæmia.

For years the doctrine of auto-infection played a prominent rôle in the nosology of so-called puerperal fever. It was contended that the poison developed within the body of the puerpera and led to those pathological changes which resulted clinically in septicæmia. Such theory is untenable to-day, in view of the proven fact that spontaneous generation of disease is not possible, and, again, in view of the fact that the recognized causative agents of disease are never found in the healthy body.

Given a woman in good health, delivered aseptically and treated thereafter in the same manner, then, unless infectious material be brought to her, she will remain in the same state of health, the transient modifications being only such as are normally associated with the processes of normal retrograde metamorphosis in the puerperal state. Apparent exceptions are offered by those cases where, during labor or the puerperal state, an abscess of the ovary or of the tube ruptures, partly or in entirety, giving rise to a clinical symptomatology like that of puerperal sepsis. Unquestionably here the sepsis emanates from the body of the puerpera, but this is a pure epiphenomenon of the puerperium. Before labor, before pregnancy, the source of infection lay quiescent in the ovary or the tube, which had precedently been infected by the reception, perhaps, of gonorrhœic virus or as the result of a badly-managed abortion.

A further exception is apparently offered by instances of what has been termed sapræmia. A woman in good health is confined aseptically. By oversight a portion of placenta or of membrane is left in the uterus. This decomposes, and, if not removed, the woman becomes infected. But why does it decompose? Because, notwithstanding all our care, it has become infected. Scores of cases prove that such remnants are carried for days and finally shed without the woman suffering harm. Where they do affect her we will find that the reason is that infectious material has been brought to the woman's body and that these remnants have become infected. To go further, it has been proven that the organisms which produce putrefaction cause the development of ptomaines which may themselves be toxic. The modern consensus of opinion in reference to this matter may be summarized as follows:—

In putrefaction tissues micro-organisms are at the bottom of the process. Infectious material is thus produced, and, if the excretion of these substances is interfered with, septic infection results. Now, the very entrance of these micro-organisms interferes, or, rather, may interfere, with excretion, and, therefore, we possess in the body, under the given conditions of putrefaction, material which not alone may poison, but which may interfere with excretion, from which necessarily infection will result.

Thus far, then, our argument has shown that the source of puerperal sepsis must be looked for outside of the body of the puerpera, and we have determined that the infectious material must be brought to the body of the woman.

Let us recall the condition of the recently delivered puerpera. We assume that the act of labor has been conducted aseptically and that the accessible lesions of the genital tract have been repaired after established rules, in order to close every possible avenue for the entrance of infectious material. Still there remains a wounded surface which offers a site for infection, and this is at the placental insertion. Micro-organisms enter the genital tract and reach this site nothwithstanding every possible precaution taken by the physician. Now, if the body of the puerpera lack the requisite resisting power, if, in other words, she is in a condition below the normal, then, her resisting power to the onset of disease being lessened, these micro-organisms flourish, the soil they ingraft themselves upon being suitable for their growth. A living ferment is at work in the tissues. Destruction of tissue may take place, or else ptomaines and leucomaines are formed. The final result is the same: The production of infectious material which poisons the body of the puerpera and leads to the symptoms of septicæmia. As will be noted later on, these symptoms vary, in a measure, according to the point of entrance of the pathogenic bacteria, the effects being purely local at the start and being kept local through the proper treatment, or else the effects being generalized and most rapidly fatal in character.

Puerperal septicæmia, therefore, is never endogenous in origin. It is always exogenous; that is to say, emanates from without. Whence the corollary dwelt upon so frequently, that the most absolute asepsis should be associated with the conduct of labor and the care of the puerperal state; and whence the further corollary that, when puerperal sepsis develops, one or more of the attendants on the woman are culpable, even though the source or the manner of infection cannot be determined.

The careful student of bacteriology will remember that a number of pathogenic bacteria have been isolated, and that, through experimentation, we are in a position to-day to expect the development of certain specific symptoms if one or another kind of bacterium gain entrance to the system. In the neighborhood of forty have been isolated as being the source of septicæmic or pyæmic processes. The student is necessarily referred to works on bacteriology for a description of the bacteria, all that we aim at accomplishing here being to impress the fact that the clinical symptoms vary with the kind or the kinds of micro-organisms which have gained entrance into the system, with the nature of the soil where they have lodged,—whether rich in lymphatic supply, for instance, or not; and, finally, that the sum-total of the clinical symptomatology must necessarily depend on the resisting power of the person in whose body they have obtained foot-hold. A puerpera weakened by precedent disease obviously will resist the onset of these infectious elements to a far less degree than the woman who has reached her term and has passed through her labor with undiminished or, rather, unweakened vital forces. All this explains the degree of virulency which the same disease—septicæmia—offers in different women infected at the same time, and after the same fashion, and at a similar site. How far this resisting power depends on the action of the leucocytes of the body is yet to be proved through careful study and research. So much may be taken for granted now, and this is that these leucocytes appear to offer a barrier to the entrance of bacteria into the system and to oppose their progress when once they have gained a foot-hold. The teachings of modern pathology only render stronger the data established from clinical study of the disease known to-day as septicæmia.

The changes found after death are of the most varied type, and yet they are only similar to those which follow death from septic infection aside from the puerperal state. The accentuation of the lesions may be more marked around the genital tract, but the systemic findings are exactly alike in sepsis following an infected wound of the arm, leg, or face as after an infection of the puerperal tract. One great fact stands prominent, and this is that the lesions vary and are widely spread, according to the lymphatic supply of the part first affected. Remembering that, first, we need a wound or abrasion where the infection may enter, it is evident that any part of the genital tract may be the site of primary infection. The lacerated perineum or cervix, the wounded endometrium at the site of placental separation,—such are the obvious points of infection. Later on in the puerperal state the abraded nipple may become infected, giving rise to a mastitis with consecutive systematic infection.

When we remember the vascular supply of the sexual system, increased manifold during pregnancy, and when we recall the rich lymphatic supply of the same system, it is not surprising that infection, starting in this locality, should very readily spread to the various serous cavities of the body and be deposited by the veins in every organ.

According to the site of the primary infection the lesions at the start are diffuse or not. Systemic infection, we repeat, supervenes, with greater or less rapidity, according as the point of primary infection is rich or not in lymphatics. Thus, infection at a perineal laceration, even though it takes on the so-called diphtheritic type, through energetic and timely local treatment, may be checked prior to the occurrence of much systemic infection, and much more speedily than can infection emanating from a lacerated cervix or the body of the uterus. Here the lymphatic supply is so rich, leading to the tubes and ovaries and the peritoneum, direct extension through the tubes being further possible, that general systemic infection may be most rapid in character.

Even in the most rapidly fatal forms of puerperal infection, where the local and the systemic lesions do not have time to become sharply marked, we shall find the lymphatics and the veins affected.

From his studies in pathology the student has familiarized himself with the essential changes associated with septicæmia. Before passing in review the clinical features of puerperal sepsis we would again emphasize the fact that, pathologically, the affection entails simply the same changes as those which follow infection of a wound in any part of the body aside from the puerperal state.

Clinically, puerperal septicæmia offers a varying symptomatology, according as the infection affects chiefly one or another of the pelvic organs and according as the infection is detected early and treated promptly. It seems to us wise to study the disease as an entity, and not to confuse the student by endeavoring to sharply differentiate a symptomatology of one infected organ from another. Very rarely, indeed, will one organ be affected, or the part of one organ, without there being consecutive affection of another. Again, it is the exception that the symptoms of infection of the system at large do not predominate over the signs offered by the local lesion. Under the subjects of treatment and of prognosis we will dwell at length on the characteristics of the individual lesions. By following this course we best impress the fact that we are dealing really with a systemic affection, even though the starting-point be a local lesion.

We proceed to note the alterations in the customary phenomena of the puerperal state known as the normal phenomena, laying stress on the meaning of certain groups of symptoms (objective and subjective). The point to remember is that we may meet with septic vulvitis, vaginitis, endometritis, metritis, salpingitis, oöphoritis, peritonitis, cystitis, etc., and each may offer cardinal evidence of its presence; but the systemic disease is the same, the constitutional disturbance only varying according to the degree and the extent of the primal lesion.

Infection of the woman may occur before labor, during labor, or during the puerperal state.

Ante-partum infection is uncommon, but when it occurs the course is ordinarily very rapid and fatal; so that on autopsy but little evidence of systemic infection is found except that the lymphatics and the veins are affected. The woman never reaches the normal puerperal state. She is confined either in the midst of systemic septic disturbance, characterized by chill, high temperature, and rapid pulse, or else these symptoms follow closely on delivery. Instances of this nature are rare, except in times of epidemic, when one woman after another is rapidly infected and as rapidly dies. Nowadays such experiences are unheard of, and such an occurrence would reflect the most lamentable ignorance and the most culpable neglect.

As a rule, it is about thirty-six hours after delivery that the first symptoms of septic infection manifest themselves. Chill is by no means a marked precursory symptom except in the so-called fulminating types of sepsis, where the woman seems to pass from health into death. Very frequently, even though the woman has a chill, it passes unnoticed. The average puerpera reacts very readily to emotional disturbances, and, therefore, a chill, should it be noted, may have no significance of evil impending. Its occurrence should, however, awaken our anxiety, even as it would aside from the puerperal state. Its significance carries the same weight as it does when it ushers in any acute affection. It may mean a developing pneumonia, or, indeed, in paludal districts, it may be only something which the woman has for years suffered from at irregular intervals. If, however, it be followed by fever of a non-intermittent type, then, in the puerperal state, our first thought should be of septic infection.

The pulse-rate affords, as a rule, most valuable evidence of alteration in the smooth course of the puerperium. A slow pulse is incompatible with sepsis in its early stage. A rapid pulse is a danger-signal. Either hæmorrhage is impending or else it may be septic infection. Danger from hæmorrhage is practically at an end thirty-six hours after delivery, particularly if on palpation the uterus is found to remain hard. Where the pulse increases in frequency and the temperature rises above 99° to 100° F. about the third day, impending mischief of a septic nature may usually be suspected. Formerly, this constitutional disturbance was laid to the incoming of the milk,—the so-called milk fever. To-day such a fever is not recognized. The establishment of the function of lactation in a woman in good health is not accompanied by constitutional disturbance. A frequent cause of disturbance about the third day, however, is the fact that the intestinal tract has not been properly cared for. There is an absorption of intestinal products resulting from retained fæcal matter, and thence the rise in temperature and in pulse-rate. A laxative should clear the scene. If it does not, then, in case no intercurrent disease is developing, sepsis is.

At once the most careful examination of the woman is called for. If the pelvic floor has been lacerated, sloughing in this locality may be found, or, possibly, the developmental stage of the so-called puerperal diphtheria. Should the pelvic floor be found unaffected, and if, on examination, the urine present none of the characteristics of a cystitis, then the cervix should be examined by speculum for sloughing process or similar pseudodiphtheritic appearance. This failing, the uterus must be carefully questioned. We are proceeding, in other words, by a process of exclusion, to establish at an early date the source of the infection whilst it is amenable, possibly, to local treatment; at any rate, before general systemic infection has progressed to a great degree.

Probably, in the vast majority of cases, septicæmia emanates from the uterus. Either its lymphatics have absorbed the septic virus directly or else a decomposing mass lies in its cavity and becomes infected. In the first instance we may have a rapidly supervening salpingitis and peritonitis; in the second instance we have, first, a sapræmia (a poisoning from the absorption of the products of decomposition), and, secondarily, a septicæmia with local lesion in the endometrium at the outset. If the process be not checked here, then, in succession, a metritis, a salpingitis, an oöphoritis, and a peritonitis may develop.

As a rule, it may be stated that the relation between the pulse and the temperature in the puerperal state is of exceeding value from a prognostic as well as a diagnostic stand-point. Acute septic conditions, where the system is surcharged, as it were, with the poison, are associated with great rapidity of the pulse and very low temperature. The system is deeply shocked by the poison; we have a condition of collapse, as it were, the temperature ranging about 99° to 100° F. and yet the pulse-rate averaging 120 to 140. A scene of this character carries the most gloomy diagnosis and prognosis. On the other hand, where the lesion is more of the acute inflammatory type and the systemic infection is slight, we are apt to have a high thermometric range, whilst the pulse remains relatively slow. Thus, in an endometritis, where the infectious lesion does not extend beyond to the tubes and the ovaries and the pelvic cellular tissue, we may note for days, until resolution, the temperature ranging from 103° to 104° F. whilst the pulse-rate remains at 115 to 120. The most virulent of all types of puerperal septicæmia—general purulent peritonitis—is usually associated with low temperature and high pulse-rate, and often, also, with flat instead of tympanitic abdomen. In short, in the puerperal state the pulse furnishes a more reliable prognostic guide than does the temperature.

Associated with rapid pulse and elevation of temperature the lochial discharge becomes altered. The lochia may be partially or altogether arrested; it may become foul, giving rise to what has been termed fœtor.

Arrest of the lochia may be the result of diminished excretion. the associate of the systemic infection, or the arrest may be only an apparent one, due to stenosis at the internal os with consequent retention and stagnation. In either event careful aseptic local examination will differentiate. If there be retention from flexion the examining finger will find the body of the uterus bent on the cervix at the level of the vaginal reflexion, and, if means be taken to straighten out the flexion, the lochia will again appear, whilst if there be arrest of secretion it will not. In the event of there being stagnation without septic infection, the constitutional disturbance will abate on the restoration of the flow. Diminished or impeded excretion of the waste products certainly causes systemic disturbance,—as is shown by the rapid pulse and the rise in the temperature, even aside from infection; but, in such a case, the temperature is apt to be high and out of proportion to the pulse-rate, whilst in deep systemic infection, as we have noted, the pulse is apt to be high relatively to the temperature. Should infection of the stagnant lochia ensue, then we may have consecutive infection of the tubes, ovaries, and peritoneal cavity.

Fœtor of the lochia is simply a sign of decomposition and is an accompaniment of sapræmia. A uterus may be infected and yet there may be no odor to the diminished lochial discharge. A sloughing pelvic floor or cervix may give rise to fœtor, and such a source should always be differentiated before we conclude that the uterine cavity is at fault. The most common source of fœtor is a portion of placenta or of membrane or a decomposing clot in the cavity of the uterus.

In this connection, then, it is to be remembered that the most acute type of sepsis may be absolutely unassociated with fœtor, whilst on the early recognition of fœtor and on its prompt treatment sapræmia may be aborted before it merges into a septicæmia.

In early sepsis pain is usually absent. As a rule, it becomes marked as the peritoneum becomes affected. Of course, pressure over the septic uterus will evoke pain, but we are now speaking of spontaneous pain. As systemic infection deepens and the various organs become affected this pain emanates from each in turn or is present in all. Thus we may have a complicating septic pleurisy with as sharp a pain over the affected lung as in case of pleurisy unassociated with septic infection. When the veins of the lower legs become thrombosed, giving rise to a phlebitis, the pain is of an acute type. Similarly, the pain associated with exudate in the pelvis is sharp and radiating. When the systemic infection is deep and associated with peritonitis of the purulent type, pain may be absent altogether, or, in case of rupture of an accumulation of pus into the peritoneal cavity, the pain may for a time disappear.

The intestinal tract sympathizes markedly with the systemic septic phenomena. Further, these phenomena are aggravated if the intestinal canal be not kept functionating. Such constipation may be the result of the septicæmia, particularly where the peritoneum is affected, when absolute paresis of the intestine frequently ensues. As a result, we have tympanites with the consequent pain in the abdomen and interference with respiration from pressure on the diaphragm. As the lesion of the peritoneum becomes more intense the intestinal coils cannot move, since they are firmly held by the bands of lymph or adhesions which are thrown out.

The upper digestive tract sympathizes, of course, as is shown by the coated tongue and the nausea and the vomiting. As the infection deepens the skin assumes the characteristic sallow hue and the exhaled breath has a sweetish odor. The woman lies in a species of typhoid condition from which it may be very difficult to rally her. Possibly, now, septic emboli are thrown off and metastases into the various organs of the body occur, giving rise to a pyæmia. Each embolus is apt to give rise to fresh constitutional disturbance, as evidenced by the repeated chills and alteration in the temperature-rate. In short, we are now dealing with nothing else than the pyæmia which occurs, independently of the puerperal condition, as the result of the infection of a wounded surface on any part of the body. It is the same story, only modified in so far as we are dealing with a puerperal woman.

As the systemic septic infection deepens the cerebral centres become affected, as is certified by the delirium, active or low in type. Concomitantly with the embolic deposits the various paraplegias and hemiplegias may develop. These affections of the brain and of the spinal cord may be temporary or remain permanent. Puerperal mania and puerperal insanity may develop and in course of time disappear or the intellect may remain affected.

In short, there is no organ and no system of the body which may not become affected by the sepic process, even as holds for septicæmia occurring aside from the puerperal state. If the woman ultimately recover it is rarely that she regains the normal in function. Some trace of an organic nature is apt to remain, be it in the nervous system, the kidneys, the heart, etc.

Such may be the clinical course of puerperal septicæmia, looked at from the broad stand-point of general systemic infection. We will now consider more in detail the separate local lesions, tracing as far as feasible the clinical picture offered by affection of one or another of the sexual organs and noting the treatment applicable in each case.

Clinically, we may differentiate the following septic diseases:—

Septic vulvitis and vaginitis.
Septic metritis and endometritis (including sapræmia).
Septic salpingitis and oöphoritis.
Septic peritonitis: (1) local; (2) general.
Septic thrombosis.
Pelvic cellulitis (including pelvic abscess).
Septic pyæmia.
Late puerperal infection.
Puerperal mania and insanity.
Puerperal tetanus.
Mastitis.

Septic Vulvitis and Vaginitis.—The vulva and the vagina, in particular the pelvic floor, are peculiarly liable to infection, since they are very accessible to contact. Rarely, further, is a labor terminated without the vulva being subject to a greater or less degree of contusion, and the pelvic floor, as a rule, suffers a certain amount of lesion, even though this be limited entirely to rupture of the fourchette. If the act of delivery has not been conducted aseptically, or if, during the puerperal state, care be not taken as regards asepsis, infection is likely to set in, and, in case of the development of local or general symptoms altering what we expect during the normal puerperal state, the vulva and the vagina should be the first locality to investigate.

Infection of the vulva, aside from sloughing and thrombosis, is very likely to spread to the glands of Bartholin. The infectious element gains access to the glands through the ducts, and this is followed by abscess. Possibly these glands may have been infected through a precedent gonorrhœa which has apparently been cured, but the latent virus has remained there, and the septic infection is characterized by a gonorrhœal complication.

Infection of the vagina may be direct at the wounded or abraded surface or it may be traced to the material used to suture a laceration. Improperly-sterilized catgut or silk will often be the starting-point of infection, and for this reason we prefer, for suture material in the emergency-surgery which lesion of the pelvic floor demands, a material, such as silk-worm gut, which may be readily rendered sterile through boiling for ten minutes.

Septic vaginitis may show itself by an increased secretion from the vagina, purulent in character and associated with a greater or a less degree of sloughing, or else we may find characteristics which, from their similarity in appearance, have been described as a diphtheria of the vagina. It is very questionable if we are dealing with a process similar to that which occurs in the throat, although clinically it makes no difference, since we have the same infiltration of the submucous tissues and the same constitutional infection.

The appearance of the vagina in these cases of so-called diphtheria is, at the outset, that of a surface covered with grayish dots which cannot be removed readily; that is to say, we are dealing with an infiltration, and not with the mere formation of a membrane on the surface of the vagina. Later these small points coalesce, giving us the appearance of a dirty-grayish deposit on the vagina. On bacteriological examination it will be exceptional that the bacillus of Löffler, which is pathognomonic of diphtheria in the fauces, will be determined, and thus we may differentiate the condition from a true diphtheria. In principle it matters not, since the treatment will be identical.

As complications of septic infection of the vulva and of the vagina we often find extension to the urethra and the bladder or to the rectum, giving us a cystitis and a proctitis. A more common cause of this cystitis, however, is careless catheterization by touch instead of by sight, and without precedent disinfection of the introitus. The characters of these complications are simply like cystitis and proctitis occurring aside from the puerperal state as the result of infection. We have painful defecation and micturition, followed by the passage of pus from the bladder or the rectum. On inspection of the rectum or the bladder we will find the mucous membrane denuded and the site of an active inflammatory process.

Septic vulvitis is likely to be followed by infection of the inguinal glands, leading to suppuration and to abscess formation, or the veins of the thighs may become affected and puerperal venous thrombosis may occur in one or another thigh, giving us the so-called milk-leg.

If not checked in an early stage the infection from the vagina may extend to the cervix and thence to the endometrium.

Whilst a certain amount of constitutional disturbance is associated from the start with septic infection of the vulva or of the vagina, the chief symptoms are local. Thus, there is swelling of the vulva, with possibly induration of one or both of the glands of Bartholin, and the woman complains of a sense of burning and of heat in the vagina. The temperature may rise one or two degrees above the normal and the pulse-rate will always be accelerated, as is common to all affections which affect the general system. The woman further complains of pain on micturition, not necessarily because the bladder is affected, but since the urine flows over the posterior commissure, which is inflamed.

These symptoms simply become intensified as the inflammatory process progresses. In case of sloughing or the formation of the pseudodiphtheritic membrane the temperature may range over 103° F. and the pulse be accelerated in proportion, rising to 130.

It is obvious that early recognition and prompt treatment is requisite to prevent extension and sloughing, which latter might speedily lead to the formation of fistulæ into the bladder or into the rectum.

According to the intensity of the local lesion and the amount of lymphatic absorption, the constitutional disturbance will vary. Usually the secretion of milk will be arrested or become diminished.

The lochial discharge will also sympathize with the constitutional disturbance, becoming arrested or diminished as the temperature rises or not. The lochia further will become fetid, but the source of the odor will be the sloughing and not decomposition in the uterine cavity, unless, indeed, the two processes are combined.

Since these lesions are the result of infection of wounds or abrasions of the vulva or pelvic floor, the symptoms will appear early or late, according to whether the infection enters during labor or at any time during the puerperal state, for as long as the wounds remain unhealed infection is possible.

The treatment of vulvitis is aseptic and expectant until evidence of suppuration offers. Aseptic cold compresses to the swollen labia will add much to the comfort of the woman, as well as in a measure modify the temperature rise. Abraded surfaces should be washed with a solution of bichloride 1 to 5000 a number of times daily, and dusted with iodoform, aristol, or bismuth, or, preferably, touched with the stick of nitrate of silver. As soon as there is evidence of suppuration, under aseptic precautions incisions should be made, the various pockets being opened up, in order to avoid extension. In case one or both of the glands of Bartholin suppurate the incisions should be made into the gland along the inner surface of the labia; the abscess-wall should be curetted and cauterized with carbolic acid; tincture of iodine and carbolic acid, equal parts; or even the actual cautery may be used. The sac is then packed with aseptic gauze and thereafter treated as any abscess-cavity would be.

If the site of infection is a perineal wound which has been sutured, the stitches should at once be removed, the infected surface washed off with bichloride solution 1 to 5000, and then cauterized with nitrate-of-silver solution 60 grains to the ounce. We thus destroy whatever germs are active on the surface, and we form a wall of the albuminate of silver through which new infection will find it difficult to enter. After cauterization the surface may be dusted with iodoform or bismuth. A number of times daily the affected pelvic floor should be irrigated with bichloride solution 1 to 5000, or with 1-per-cent. creolin solution, and afterward dusted again with one or the other powder. Vaginal douching should be avoided so long as the lesion is localized at the introitus. The only effect of douching would be a possible infection of the upper vagina or the cervix.

Cystitis is to be treated according to the recognized methods apart from the puerperal state. The bladder should be irrigated every four hours with a saturated solution of boric acid, and diluents should be administered *pro re nata.* Eurotropin, 5 grains every four hours, internally, may be tested to advantage.

Proctitis is best treated by the local application of a solution of nitrate of silver 60 grains to the ounce. This application is, of course, to be made through a speculum.

So-called diphtheritic vaginitis calls for the same treatment, except that the measures at the outset should be more radical. The application of subsulphate of iron, which is strongly recommended, we do not favor, since the caustic effect is but slight and superficial and the resulting slough is very prone to decomposition. Cauterization with the chloride of zinc in 50-per-cent. solution is highly recommended, but we question if it be necessary to cauterize so deeply aside from the difficulty of limiting the action of the zinc. Where the process is just beginning the whitish patches may be touched to advantage with the actual cautery, or they may be scraped off with the curette and a solution of nitrate of silver, 60 grains to the ounce, may be applied. In case the infiltration has extended widely before it is discovered we believe that the best measure is thorough cauterization of the surface with the actual cautery. The surface is then kept powdered with iodoform or bismuth and carefully watched for the detection of evidence of spreading, when the same cautery should be used. In view of the favorable effects derived from resort to antitoxin in diphtheria of the fauces, in the event of the process in the vagina being true diphtheria—as evidenced by the finding of the Klebs-Loeffler bacillus—injection of the antitoxin suggests itself as a wise measure.

The treatment of local lymphatic extension will be referred to under the heading of "Septic Thrombosis," since the affection of the lymphatics is usually associated with that of the veins.

The constitutional treatment is self-suggestive. An abundance of liquid food—in particular, milk—should be given, and stimulants according to the condition of the pulse. It will do no harm to give 5 grains of the carbonate of ammonia every four hours as a routine measure, since the tendency of septic poisoning is to weaken the heart. In case the stomach is not tolerant the drug may be given in double the dose by the rectum. The bowels should be kept regular by laxatives and enemata, and opium should be avoided except when stringently called for, when codein should be tested in large dose—1 grain by the mouth and 2 by the rectum—before other alkaloid of opium is administered. The temperature rise need not be a source of anxiety. It is simply an evidence of the systemic infection, and it may be kept within limits by the application of an ice-bag. Antipyretics should be avoided,—in particular the coal-tar derivatives, which have such a weakening effect on the heart.

Metritis and Endometritis.—Whilst endometritis may exist and run its course without the concurrence of metritis, the presence of the latter necessitates the former. The etiological factors are extension infection from the lower genital tract, direct infection at the site of placental separation, contact infection by unclean hand or instrument introduced into the uterus, infection from a sapræmia, the result of the decomposition of clot or remnant of placenta or of membrane left in the uterine cavity.

It is essential to differentiate sharply the infection following on sapræmia from that which results apart from the latter, since the clinical signs are different, as also the demanded treatment.

Infection following sapræmia, or putrid infection, may be an early or a late phenomenon of the puerperal state. Ordinarily the symptoms manifest themselves about the third day, but in many instances nothing abnormal may be noted until a much later date, in certain cases not until the woman has been practically discharged from observation. Remnants of placenta and of membrane or clot (partially organized and partially attached) may remain in the uterine cavity for days without giving rise to local or constitutional symptoms, so long as these retained particles do not become infected. For this reason the symptomatology is of the most varied nature.

Ordinarily the course of events is as follows: About the third day we note increasing rapidity in the pulse-rate without elevation of temperature above 99° F. Chill may occur, but usually it is slight or absent altogether. It is more likely to be marked in instances where the lesion is of a sharp inflammatory nature from the start, instead of being characterized by a process of slow systemic poisoning, so to speak. The lochial discharge very shortly becomes altered. There is apt to be diminution in quantity and the color becomes darker and the consistency thicker. Gradual diminution or suppression of the lochia is only likely to set in at an early date, where there exists, as a complication, stenosis of the cervix with defective drainage. The odor of the lochia shortly alters; it becomes stale or of a most pronounced necrotic quality. On local examination the uterus is found to be larger than it should be at the stage of the puerperal period, and it is also softer on bimanual palpation. As the case progresses the endometritis merges into a metritis, and then we find a soft, boggy uterus, tender on pressure. Pain is apt to be absent until the tubes and the ovaries or the uterine covering of the peritoneum become affected, when, in addition, there is present a variable amount of tympanites, the evidence of paresis of the intestines, the result of the systemic infection. If the condition be overlooked or if the proper therapeutic measures are not resorted to, the general systemic infection progresses through lymphatic absorption and direct extension through the Fallopian tubes, and we note the development of peritonitis, local and general, with, at a still later period, thrombosis and embolism and pyæmia.

Should the endometritis be the consequence of contact infection without sapræmia, the symptomatology is different, and the physician, unless especially observant, is apt to be led astray. In

CHAPTER XIV.

FORCEPS.

It is not intended here to enter into the history of the subject, nor to describe the various instruments and their modifications which are in general use. The special modification of the instrument is of very much less service than an accurate knowledge of its use. Recognizing the fact that traction is the essential power of forceps, it will appear that any instrument which is easily kept clean, easily adjusted to the child's head, and which is rigid enough to prevent slipping, will be the instrument which will meet the greatest number of requirements.

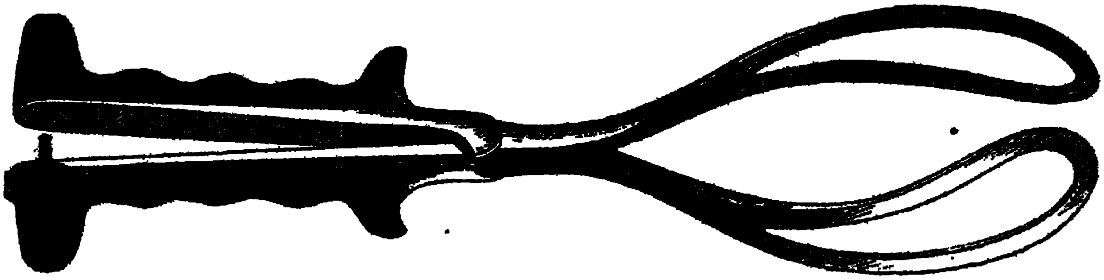


Fig. 51.—Elliott's forceps.

Numbers of instruments have been devised, which, though not perfect, will so nearly meet these requirements as to leave little to be desired. A forceps which is in very general use, and which is capable of being adapted to a large number of cases, is Elliott's (Fig. 51). This is a long, well-curved, and somewhat heavy instrument, which has an adjustable screw in the handle, by means of which the amount of pressure on the head can be regulated. While this is a convenience, it is no easy matter to keep the screw aseptic, and the same end may be gained by placing a folded towel between the handles of instruments not furnished with this attachment.

An instrument which is not in very general use, but which undoubtedly possesses merit, is known as Hunter's (Fig. 52). This instrument, having almost no handle, is grasped by means of a bar formed by the locking of the two blades. A firm purchase is attained in this way, and the hand is so near the head of the child that but little leverage force is possible. The shortness of the handles renders this forceps easy of application.

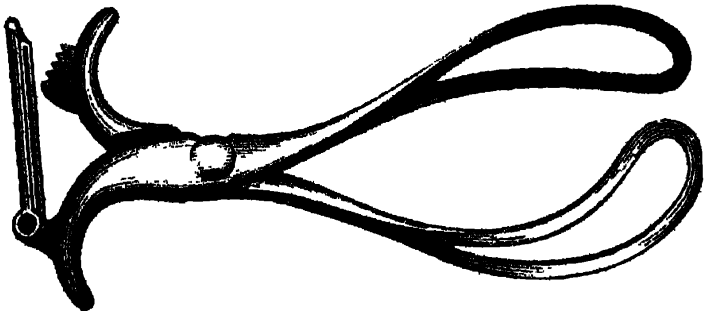


Fig. 52.—Hunter's forceps.

In addition to possessing some instrument which will meet the requirements mentioned, the operator who wishes to be prepared to meet emergencies must, of necessity, supply himself with some instrument which will permit him to make use of the principle of axis-traction. This can be found best, perhaps, in the instrument as devised by Tarnier and modified by Lusk (Fig. 53). The disad-

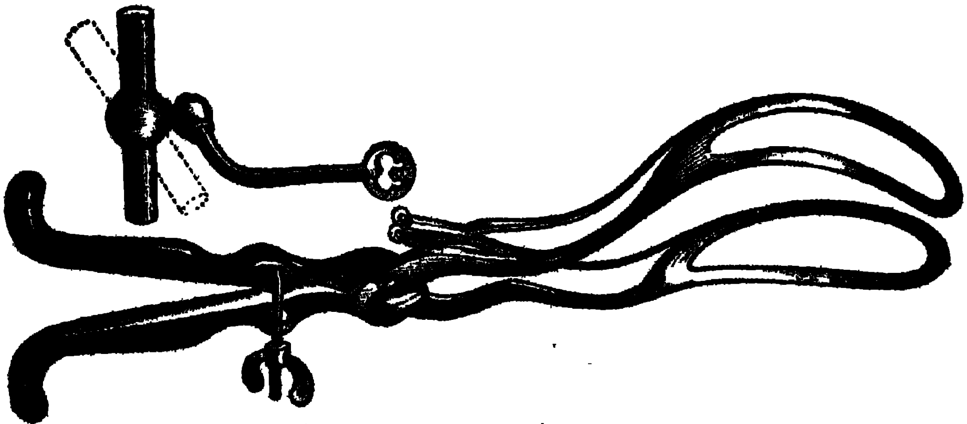


Fig. 53.—Lusk-Tarnier forceps.

vantages of this instrument are that it is heavy and adds an amount of weight to the obstetric bag which is objectionable. It is somewhat expensive, thus deterring some from supplying themselves with it. Objections of this nature, however, should finally yield to the established fact that in the high and median forceps application delivery is greatly facilitated through axis-traction, and, furthermore, less damage is likely to be inflicted on the maternal soft parts, provided the operator understand the use of the instrument and constantly appreciates its power. Outside of France the student is rarely trained to the use of the axis-traction instrument, and yet only by means of it can thoroughly-intelligent traction be made in the proper axis—that of the pelvic inlet. The traction-rods enable the operator to pull directly downward, and thus the presenting part is enabled often to enter the superior strait, whereas

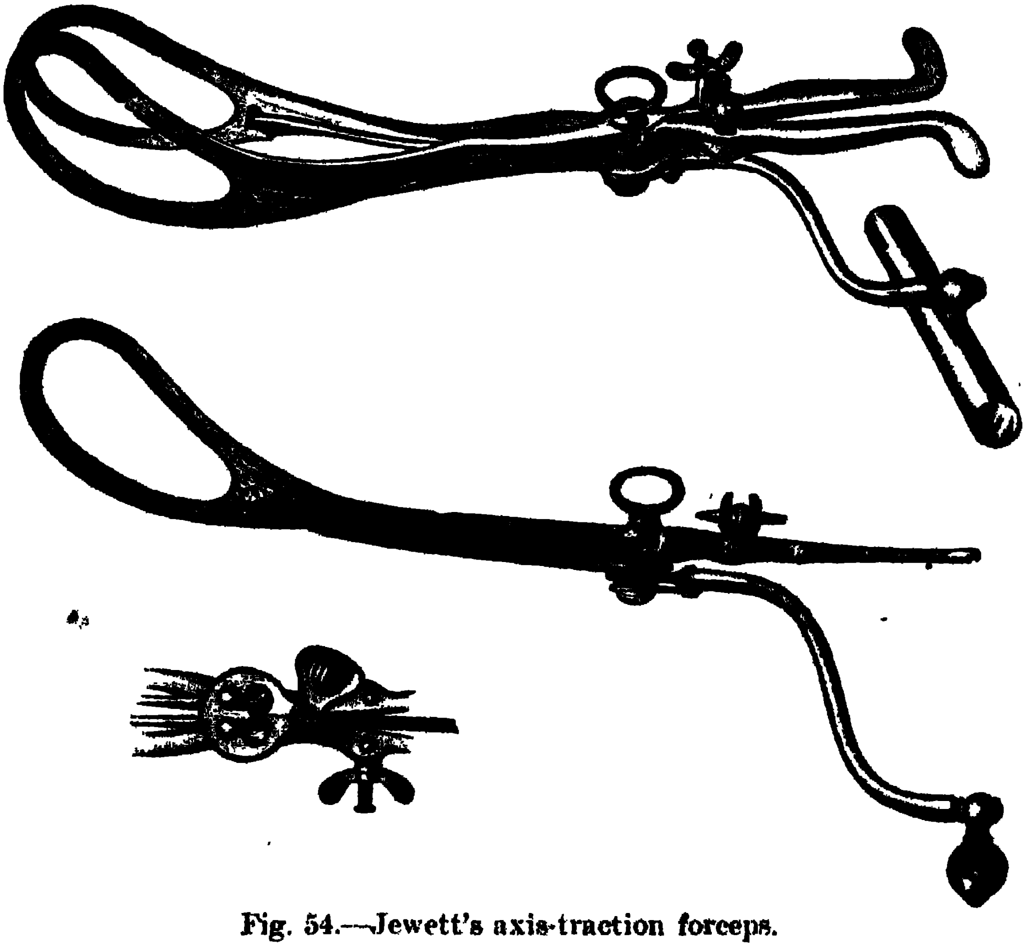


Fig. 54.—Jewett's axis-traction forceps.

without the traction-rods it becomes blocked, as it were, at the inlet. Time and again forceps delivery from the pelvic brim is feasible when the axis-traction forceps is used where it would be impossible without the instrument. As will be noted later on, less tractile force is required because less is wasted, spontaneous rotation is favored, there is less bruising of the maternal parts, and less injurious compression of the fœtal head than are associated with any other form of forceps. And yet the instrument, used without accurate knowledge, is a dangerous one. Should the traction-rods not be kept in parallelism with the handles, the instrument is apt to slip and tear deeply the maternal parts; furthermore, the compressive force is greatly in excess of that of other forceps, and if this be not realized the fœtal head may suffer irreparable damage. The application of the axis-traction instrument differs in nowise from that of the simpler type of forceps, and since the traction-rods may be readily removed, the instrument is also of value in low applications. The axis-traction rods of Reynolds are light, take up but little room, and are inexpensive. At the same time they are of service only in median applications and cannot fill the rôle of the complete instrument. They may be attached to any pair of fenestrated forceps. This contrivance consists of a pair of steel rods, which terminate at their upper ends in flat buttons intended to engage in the lower extremity of the fenestra; and at their lower ends in hooks, which are received by rings connected with a transverse traction-handle. The appliance is perfectly simple, and any operator can easily apply it to his ordinary forceps. They may be fastened to the forceps-blades either before or after the blades have been adjusted to the child's head (Fig. 55).

Traction is not the only force of which the forceps is capable, for compression and leverage are coincident to a greater or less degree.

In order that the forceps may not slip, a certain amount of compression is necessary when traction is being made. It is wise to remember this specially in those cases where the operation is prolonged, in order that injury may not result to the child. From time to time the instrument should be unlocked and the handles slightly separated, thus liberating the fœtal head. The forceps is not used for this compression force; it is simply an unfortunate condition, without which traction cannot be made. Ordinarily, indeed, sufficient compression to prevent slipping results from the apposition of the blades to the pelvic wall. It is better that traction should be of an intermittent character, if for no other reason than that the head may be relieved of this necessary compression at least every two minutes.

Most authors hold that any form of leverage to be obtained by forceps is not only objectionable, but absolutely harmful. The use of the swinging or pendulum motion during traction may easily result in dangerous consequences to the mother, and should not be attempted. Without any doubt, a very slight up-and-down motion will facilitate the extraction; but it must be borne in mind that, at the same time, the free ends of the forceps may be ploughing into the maternal soft parts.

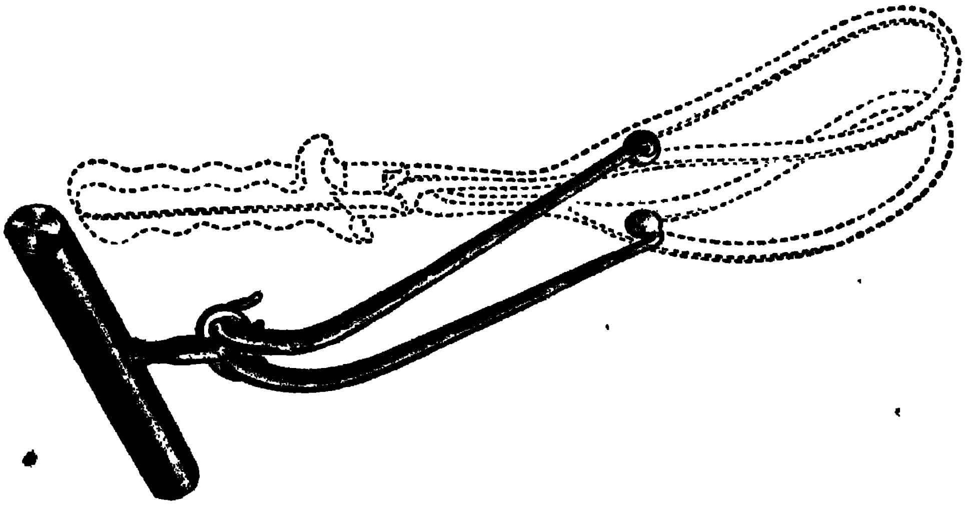


Fig. 55.—Showing Reynolds's traction-rods in position.

Direct traction is fraught with so little danger to the mother, and will so certainly be successful in those cases where the forceps is indicated, that it would be better never to resort to this pendulum motion. Instrumental rotation should not be attempted, for maternal injury is almost certain to result. However, it is necessary for the physician to bear in mind that if the forceps has been applied before rotation has taken place he must be careful not to prevent it by rigidly holding his instrument, but, when rotation is occurring, the forceps should be removed and reapplied.

Indications.—In a general way it may be said that inability of the mother's expulsive forces to overcome the obstacles to delivery is one of the most frequent indications.

Secondly, any cause which requires that the delivery should be accomplished rapidly, either in the interest of the mother or the child, provided, for other reasons, that the forceps is not contra-indicated, makes its application justifiable.

Forceps should not be applied to the hydrocephalic head, a decomposing fœtus, nor upon a perforated head. If applied to the hydrocephalic head or one that is decomposing, it will almost certainly fail to hold, and, even if successful, the end gained is not commensurate with the risk of injury to the mother. The perforated head can be better handled with a cephalotribe.

Forceps should not be applied until the os is three-quarters dilated or dilatable, nor until the membranes have ruptured and retracted. If the membranes have not retracted, there is the possibility that they may be grasped by the forceps and placental detachment occur.

The actual size of the os is of less importance than its dilatability. Forceps should not be applied until the elasticity of the cervix justifies the easy introduction of the blades, and even then it is preferable to complete the dilatation by the hand before inserting the blades.

There must be no mechanical obstruction on the part of the pelvic canal which will prevent the delivery of the child without unusual force. Carcinoma of the cervix, inasmuch as the cervix is rendered so friable, is a contra-indication to the application of forceps.

Forceps should not be applied where the fœtal head and the pelvic canal are so disproportionate that the probability of delivering a live child seems small.

Finally, forceps should not be applied until the head has engaged.

In regard to the time which should be allowed to elapse before the obstetrician resorts to instrumental delivery, it must be remembered that it is a question of conditions, and not minutes or hours. Undoubtedly many women would escape that condition of pelvic relaxation, which is so often seen, following tardy deliveries, if forceps were used before the muscles entering into the pelvic floor were paralyzed from overstretching. As soon as it is evident that the *vis a tergo* is not sufficient to overcome the resistance, then forceps should be applied. Another very safe rule to remember is: whenever the head fails to recede after a contraction of the uterus, forceps should be applied. The failure of the head to recede after a contraction shows that undue pressure is being made on the soft parts of the pelvic canal.

Anæsthesia.—Although it is probable that the extraction of the child with forceps is but slightly more painful than normal delivery, yet it is rarely justifiable to apply forceps until the patient is thoroughly under the influence of the anæsthetic. The danger which may result from some sudden motion on the part of the woman is greater than the danger of the anæsthetic, to say nothing of the increased ease of extraction on the part of the obstetrician. Chloroform is so much more rapid in its effects, and leaves so little to be desired as an anæsthetic, that it is preferable to ether. The patient should be anæsthetized to the surgical degree before the instrument is applied.

Many authors hold that the application of forceps is only justifiable in head presentations. Undoubtedly it will seldom be necessary to apply it to the breech, but there are conditions which will render the application of forceps to the full breech very advantageous.

It is absolutely necessary to make a correct diagnosis of the position of the child and the causation of the tardy natural delivery before the application of forceps. Before the examination is made which is to determine these points, it is better that the obstetrician have everything in readiness, so that no delay may occur. He should see that the usual heart stimulants are at hand. An hypodermic syringe and fluid extract of ergot should be in readiness. The instrument should be sterilized and placed in a basin containing 1 to 100 creolin solution.

Inasmuch as in forceps cases repeated digital examinations are made, it is wise to exercise unusual care in rendering the hands aseptic. They should be thoroughly scrubbed with soap and hot water, and afterward *immersed* in 1 to 1000 bichloride-of-mercury solution for five minutes and then in alcohol. The patient should be anæsthetized and turned across the bed so that the hips will extend well over its edge; the knees can be held by two assistants sitting on either side of the patient. The anæsthetic should be given into the hands of a physician who will have no other duty to attend to.

The external genitals and vagina should be cleansed with soap and water and a soft scrubbing-brush, and afterward douched either with 1 to 3000 bichloride-of-mercury solution or 1 to 100 creolin solution.

After palpating the abdomen, one hand should be passed into the vagina if the head is high, and with two fingers the operator should carefully palpate the fontanelles. If there be any doubt about their relation to the pelvic canal he should seek an ear, and finding it will enable the diagnosis to be made with certainty. At the same time he can determine if any obstruction on the part of the mother exists. The fœtal heart-sounds should be listened to, for their character will enable him to determine somewhat the effects of tardy delivery on the life of the child. The forceps is usually applied while the patient is on her back, though some prefer the left lateral posture. The bladder and rectum should be emptied before any operative procedure is undertaken.

The operator, having assured himself of the exact position of the child's head, and that there are no contra-indications to delivery by the forceps, proceeds to apply it.

The blades, for purposes of designation, are known as right and left, corresponding to the right and left sides of the pelvic canal. The left blade should be introduced first on account of the method of locking. The left blade, grasped near the handle with the left hand, is introduced into the vagina (Plate XXXIX) and Fig. 56). Two or more fingers of the right hand passed into the vagina until the head is felt will serve as a guide to its introduction. The blade is made to glide along the palmar surface of the right hand and pass between the fingers of that hand and the head. It is necessary to remember the two curves of the forceps in introducing it. As the blade passes the fingers the handle is to be depressed and carried slightly outward. At no time must force be used in its introduction. If the blade cannot be made to easily adjust itself, it is better to withdraw it entirely and make another attempt. Force is so certain to do injury to the soft parts that it is never justifiable.

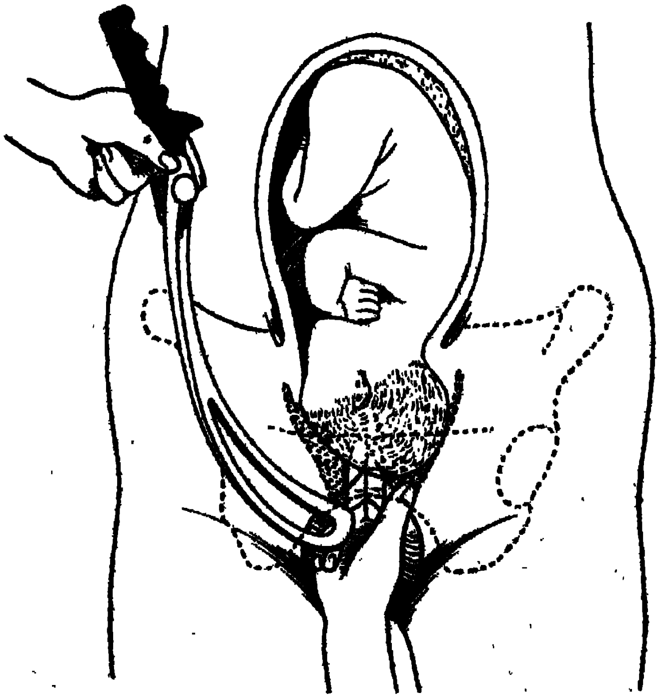
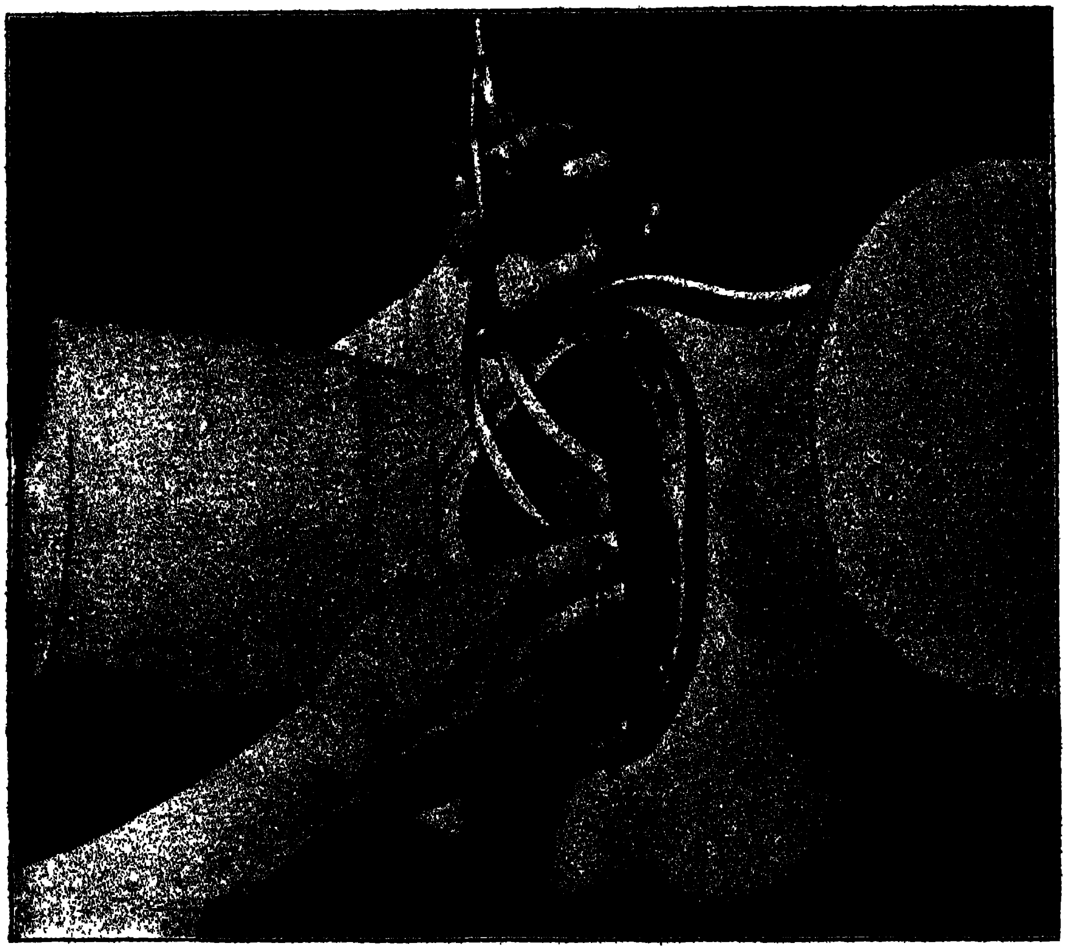


Fig 56.—Introduction of the left blade of the forceps

After the left blade has been introduced its handle should be given to an assistant, and the right blade introduced. Here the left

PLATE XXXIX.



Introduction of the Left Blade of the Forceps.

hand acts as the guide and the right hand manages the blade (Fig. 57). No attempt should be made to introduce the blades during a contraction of the uterus.

It is customary to apply the blades first to the sides of the pelvis, irrespective of the position of the child's head, and afterward, if possible, to have them grasp the child's head in its biparietal diameter. As soon as the blades are passed and adjusted, they should be locked (Fig. 58). This is usually accomplished easily by slightly depressing both handles. Should this not accomplish the desired end they may be advanced or slightly withdrawn, and another attempt made to lock them. Forced locking must not be attempted. The very fact that the blades will not lock easily indicates that there is either faulty application or else the case is not one in which forceps should be used.

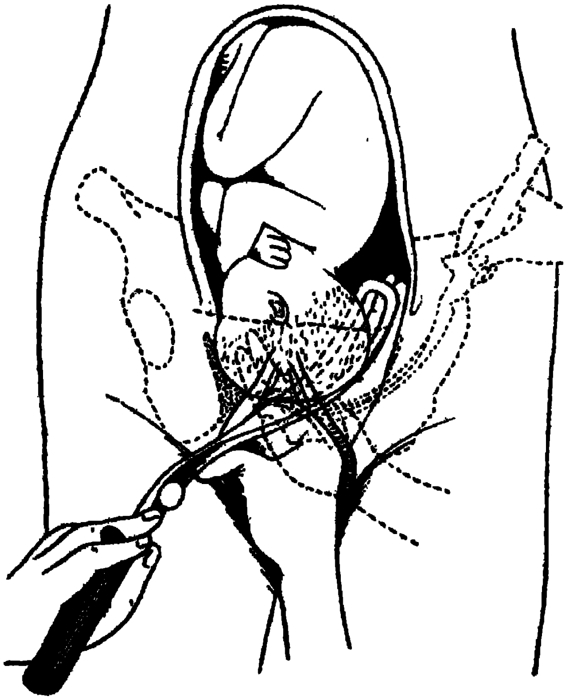


Fig. 57.—The left blade introduced; the right blade (in outline) ready to be introduced.

There is no operation which calls for more gentleness, judgment, and patience than the application of forceps. It is always necessary to bear in mind the possibility of including the mother's soft parts in the grasp of the forceps, and the injury which would result therefrom.

Forceps operations may be divided into low, median, and high applications. Again, whether the occiput is anterior or posterior, and whether the head is proportionate to the pelvic canal or not, must be taken into account.

The Application of Low Forceps, Occipito-anterior Position, Head and Birth-canal Proportionate.—This operation is the most simple of all forceps deliveries. It is indicated when for any reason it is an advantage to mother or child that the labor be terminated. These are the cases where non-interference so often results in injury to the mother's pelvic floor, the head remaining on the pelvic floor for so long a time that the levator ani muscle and the triangular ligaments are not able to regain their tonicity after the labor and their diaphragmatic action is impaired.

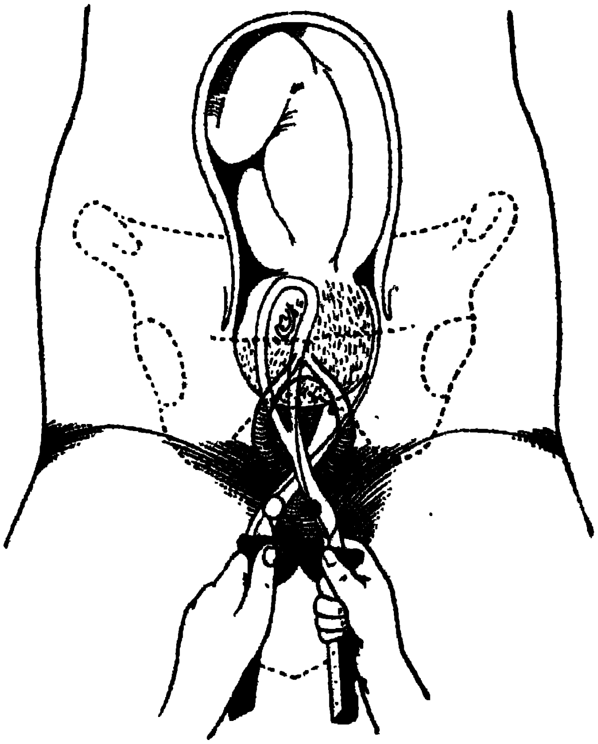


Fig. 58.—The forceps adjusted and ready to be locked.

It must be borne in mind that the abdominal muscles play by far the greater part in the act of expelling the head from the vulva, and in women of poor muscular development or in those who have become thoroughly exhausted from a prolonged first stage the muscular force necessary to expel the head may be wanting. Many of these women would undoubtedly deliver themselves if left alone; but the question arises whether or not they will not suffer more injury, and of a more permanent character, if unaided, than could possibly result from the application of low forceps. It is not intended by this to mean that every woman should be delivered with forceps as soon as the head is low down, but simply as an opinion that many women are permanently injured by reason of an unnecessarily prolonged second stage.

Under strict aseptic precautions, as already mentioned, the blades are applied over the biparietal diameter of the child's head. As soon as locking has been accomplished, it is well to make tentative traction to see that the forceps has a firm grasp.

The instrument should be grasped with the right hand, with palmar surface downward. Should the instrument have transverse shoulders, the index and middle fingers should be placed over one shoulder and the remaining fingers over the other. In using Hunter's forceps it is often a relief to place a towel over the crossbar and with the right hand to grasp the towel. (Plate XL, Fig. 1.) The left hand should be placed against the patient's buttocks, with one finger over the fourchette. This will enable the operator to determine just how much force he is exerting on the perineum. Traction should be made downward, or as nearly so as the perineum will permit, thus accentuating flexion (Fig. 59). Pendulum or swinging force during traction is contra-indicated. Firm traction exerted for not more than one minute will accomplish the extraction if persisted in. It should be the operator's attempt to imitate nature as nearly as possible in preparing the perineum for the delivery of the head. This can be done by allowing the head to recede after each traction. He should also release the grasp of the forceps slightly at each recession, that the brain may not be injured.

In the majority of cases calling for instrumental extraction pains are so infrequent that it is not wise for the operator to wait for the help which uterine contractions may give him, but he should make traction irrespective of their presence. Well-directed abdominal pressure on the part of an assistant will be of undoubted value. If it is evident that perineal laceration is impending, it is better to at once perform episiotomy. This little operation is no doubt worthy of more consideration than it has ever received. The measure is a simple one, consisting only in relieving the strain on the perineum by making a lateral incision on either side of the vulvar orifice. (Plate XL, Fig. 2.) The incision need not be more than an eighth of an inch in depth and half an inch long, extending up into the vagina. It is not likely that hæmorrhage of any consequence will result from this procedure, but, even if it should, a continuous catgut stitch will control it without difficulty.

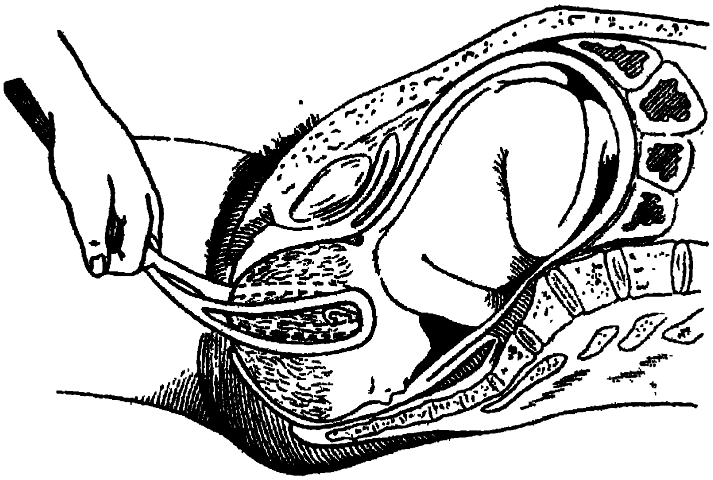


Fig. 59.—Showing the direction of the line of traction.

As soon as the occiput is brought well down underneath the pubic arch, the forceps should be removed and the head delivered *between* pains, by introducing the finger into the rectum and, finding the chin, tilting it out over the perineum. As soon as the head is delivered it should be held so that the shoulders may not be driven through the vulvar outlet during a pain; but as soon as the

PLATE XL.

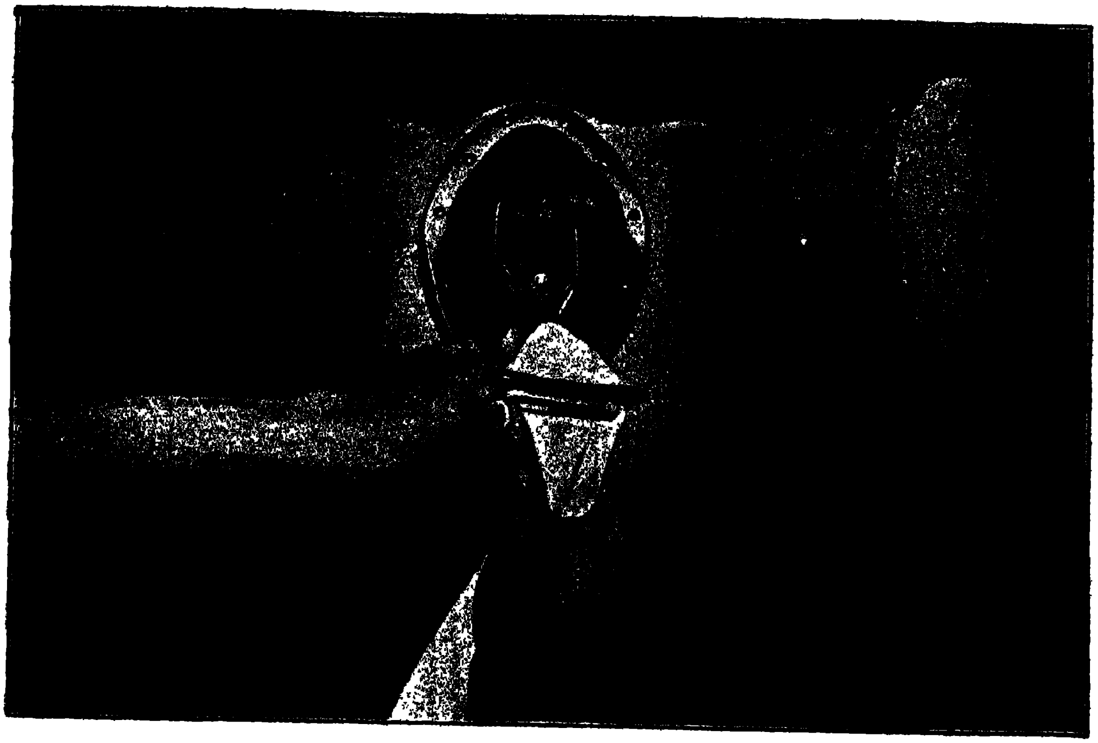


Fig. 1.—Towel Applied to Handle of Hunter's Forceps.

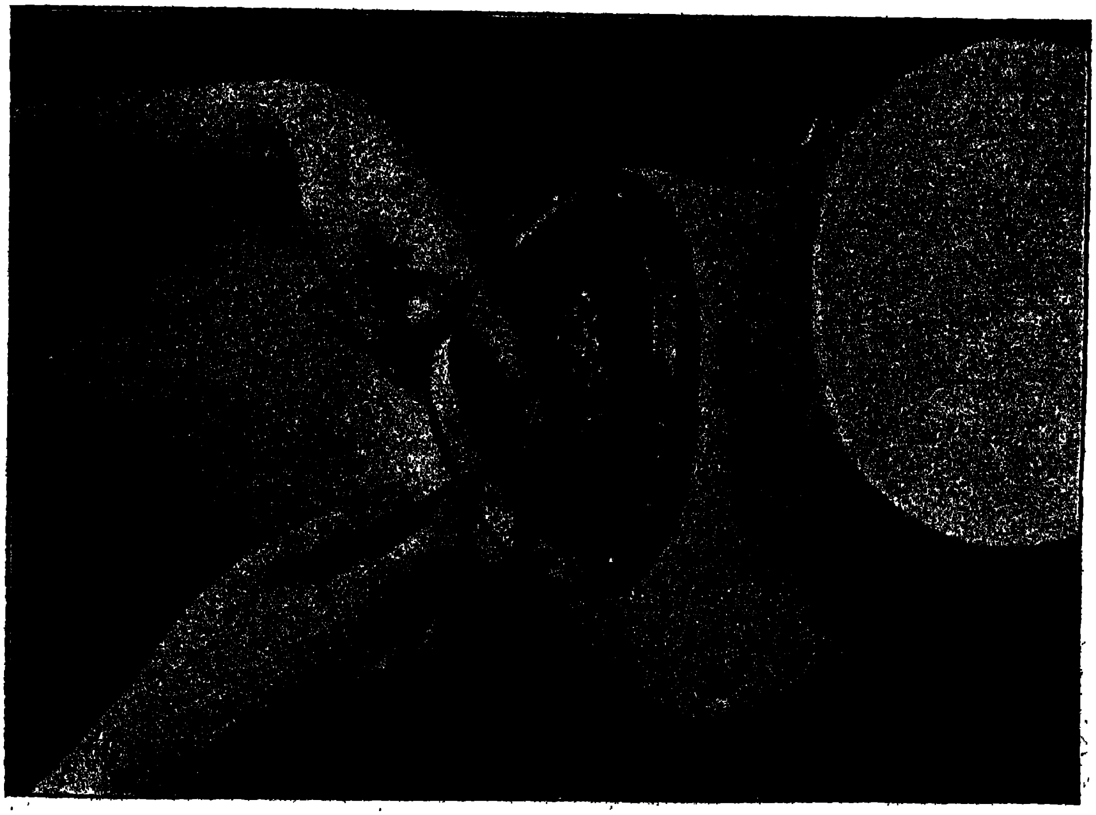


Fig. 2.—Bilateral Incision of the Perineum (Episiotomy).

contraction, which is nearly always excited by the delivery of the head, has subsided, they may be lifted out as was the head.

Low Forceps in Occipito-posterior Position, with Partial Rotation.—It has been shown that firm uterine contractions, forcing the fœtus to travel over the inclined planes of the pelvis and resisted by a firm perineum, will cause the occiput to rotate forward. Should any of these factors be absent rotation may not be complete, and the fœtus will occupy an oblique position with occiput posterior. Usually, by giving the mother a rest, firm contractions will ensue and anterior rotation and normal delivery take place. It often happens, however, that in the interest of mother or child instrumental delivery becomes necessary.

After a very careful examination, so that the exact position of the occiput is made out, forceps should be applied in one of two ways: either directly to the sides of the pelvis or else in an oblique position.

The latter is more difficult, but is preferable on account of the lessened risks to the child. The forceps should be applied in that oblique diameter which is not occupied by the head. This will cause the blades to grasp the biparietal diameter of the head. The rule that the left blade should be introduced first should be disregarded here, unless it be at the same time the anterior blade, for this is the difficult one and should be first introduced. Unusual care must be taken to guard the mother's soft parts from injury. The forceps should be unlocked after each traction, which not only lessens the danger to the child, but also by releasing the head permits rotation to take place. At no time must instrumental rotation be attempted, nor, on the other hand, must natural rotation be prevented. Oftentimes it is wise to remove the forceps altogether and readjust it over the biparietal diameter, which may have changed its position. By patience and absence of any desire on the part of the operator to hasten the rotation, the head will often gradually mold itself, and under the tractions of the forceps, which acts as a re-inforcement to the expellant forces, rotate anteriorly.

If, after patient and gentle efforts, it be impossible to adjust the forceps over the biparietal diameter, it should be applied directly to the sides of the pelvis. The same care must be exercised here that the mother's soft tissues are not injured. It is also imperative that tractions should not be prolonged longer than a minute, and that the grasp of the forceps be relaxed between tractions. The child is put to such a disadvantage, even under these circumstances, that its life is often seriously jeopardized, and the operation is done primarily in the interest of the mother.

Low Forceps in Occipito-posterior Position.—It is the general opinion among obstetricians that few abnormalities produce a more difficult condition to terminate successfully than those cases where the occiput has rotated posteriorly and is wedged in the hollow of the sacrum. Fortunately these cases are not very frequent, for the child's condition is most perilous and injury to the mother's soft parts almost certain.

It is far better to delay the application of forceps in these cases as long as possible, so that, under continued uterine contractions, anterior rotation may occur. If, however, the mother is showing signs of exhaustion, or if the fœtal heart become feeble, then there is no other resort but to apply forceps. Delay beyond this point is not admissible.

The patient should be anæsthetized and the parts rendered aseptic, as before suggested. Carefully guarding the soft parts, the blades are applied to either side of the child's head. A moderate amount of pressure is necessary to prevent the blades slipping, but by relaxing the grasp frequently the injury to the child will be greatly lessened. As soon as the forehead is made to appear beneath the pubic arch it is well to remove the forceps, and, unless the reasons for immediate extraction are urgent, it is well to give nature a chance to rotate the occiput anteriorly. Otherwise, in place of making traction horizontally, as is necessary when bringing the forehead underneath the pubic arch, the handles should be lowered as far as the perineum will permit. This manœuvre will cause marked extension of the head and the forehead will be brought underneath the pubic rami. Forced extension now will cause the forehead to clear the pubes. The forceps should now be removed and, passing two fingers into the rectum, the head should be flexed until the occiput escapes over the perineum.

Laceration of the perineum will be almost certain to occur, and it should be repaired at once.

As already stated, these cases are among the most difficult ones found in obstetrics, and one of the hardest things to resist is the desire to attempt instrumental rotation. It will only be necessary to remember to what degree of injury to the pelvic floor this will subject the mother, to deter one from this procedure.

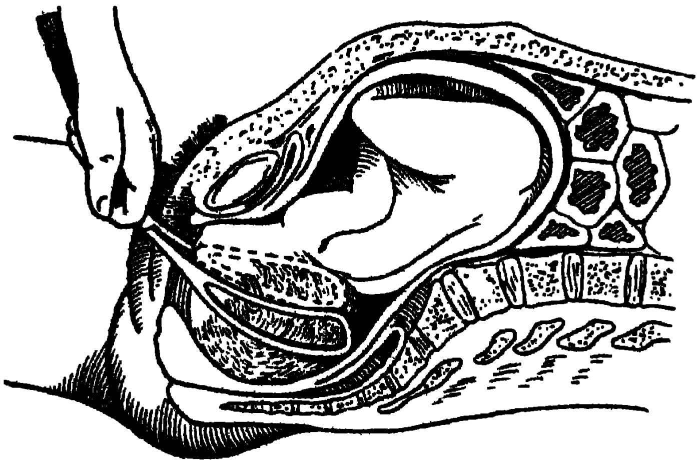


Fig. 60.—Showing direction of traction in face presentation.

Low Forceps in Face Presentations.—The application of forceps in face presentations, when that condition has not been diagnosed until after the face is well down in the pelvic canal, should be delayed as long as is consistent with the safety of the mother and child, in order that anterior rotation of the chin may occur. This rotation is nearly always tardy, and sometimes does not take place at all. Manual rotation of the head, if not too firmly wedged, is permissible and sometimes successful, but at no time should forceps be used to bring about this rotation. If the chin has rotated anteriorly, forceps should be applied directly to the sides of the child's head. A firm grasp must be taken and some compression used to prevent the blades slipping. Traction should be made horizontally until the chin is brought underneath the pubic arch, when the handles should be raised and the cranial vault and occiput lifted over the perineum. If the chin is turned posteriorly and the head is wedged in the pelvic outlet, there is so little probability that a living child can be extracted that it seems to be the part of conservative treatment to turn the attention entirely to the welfare of the mother and do craniotomy, or, in favorable cases, symphysiotomy.

Forceps in Breech Presentations.—Forceps should not be applied to the breech until after it has firmly engaged. When, however, the breech has entered the pelvic canal, and yet is too high to permit the finger passing over the groin or the application of the fillet, Tarnier's axis-traction forceps will be most advantageous. A dilated or dilatable os will render the operation so much more easy of success that this should be accomplished before the application of forceps. The majority of these cases are met in old primiparæ, where the parts are more than usually rigid, and the time spent in dilating the cervix will not be wasted. If rotation has occurred, the blades should be applied over the sacrum and posterior aspect of the thigh.

It is here that caution will be necessary to prevent the blades impinging so firmly on the parts that the child will be injured, and at the same time firmly enough so that they will not slip and injure the mother's soft parts. Hence it is better to make tentative traction at first, to see that the grasp is firm. The application of the principle of axis-traction to forceps enables the operator to use very much less force in the extraction, inasmuch as the resistance caused by the pressure of the presenting part against the anterior pelvic wall is very much lessened. Traction should be made only during a contraction of the uterus, unless the pains be too infrequent. If this should be the case, it is better to imitate the methods of nature and permit the recession of the breech after each traction. The rigidity of the canal will rapidly lessen under the influence of the advance of the breech, and the integrity of the soft parts will more likely be preserved.

If this intermittent traction is used, a very small amount of force will accomplish the delivery of the breech. Should the hips be transverse, it is better to attempt manual rotation first. If this is not possible, then the blades should be applied to the lateral surfaces of the thighs (Fig. 61). It is not expedient to allow the blades to embrace the crests of the ilia, inasmuch as the bones are too compressible and the forceps is almost certain to slip. In all cases well-directed pressure over the fundus will greatly facilitate the extraction.

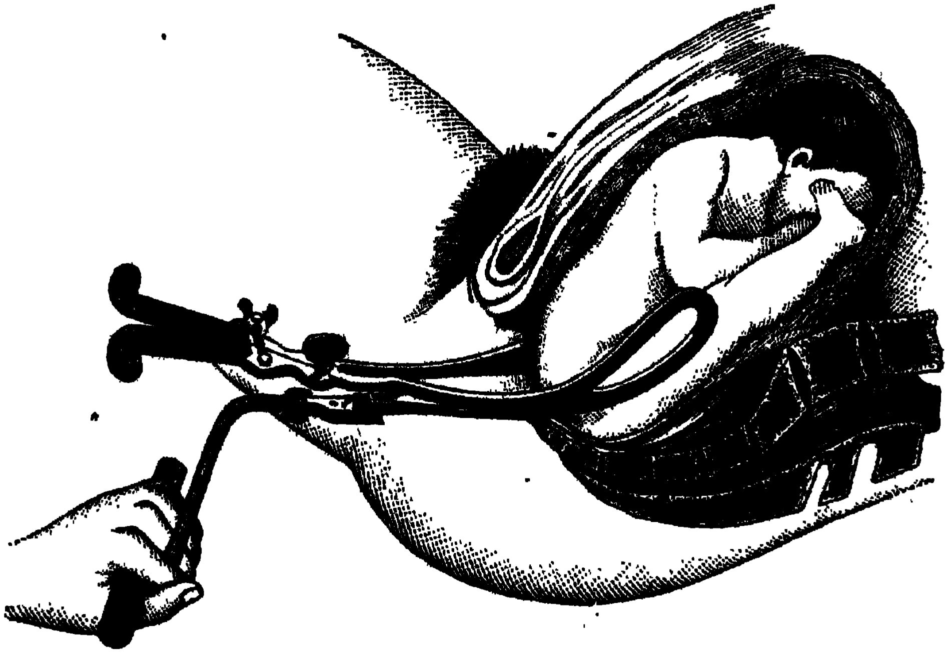


Fig. 61.—Tarnier forceps applied to the thighs.

The Application of Median Forceps.—Most authors refer to all forceps operations above the inferior strait as high forceps, and confuse in this way two very different operations. When the head has firmly engaged, indicating that its greatest diameter has entered the pelvic inlet, it seems better to consider it as being in a median position, and, should it become arrested there and necessitate extraction, to call the operation median forceps. This condition depends either on the disproportion of the head and the birth-canal or on lack of uterine force to overcome the resistance which is normally present.

This operation is fraught with far more danger than low forceps, for the blades of the instrument must of necessity enter the lower uterine segment, when the most extreme caution will be necessary to prevent injury to the uterus. Hence it is advisable to delay the application of forceps until instrumental delivery seems imperative to the mother or child, or both. If the undilated cervix is preventing the advancement of the head, it is far better to *manually* dilate it than to use the forceps as a dilating force, as is advised by many. Should cicatrization from any cause render the cervical tissue non-dilatable, the little procedure of nicking the cervical ring, as will be described in the chapter on "Version," will greatly facilitate the dilatation. This little operation should not be confounded with the Dührssen incisions, which are of greater magnitude and involve the lower uterine zone.

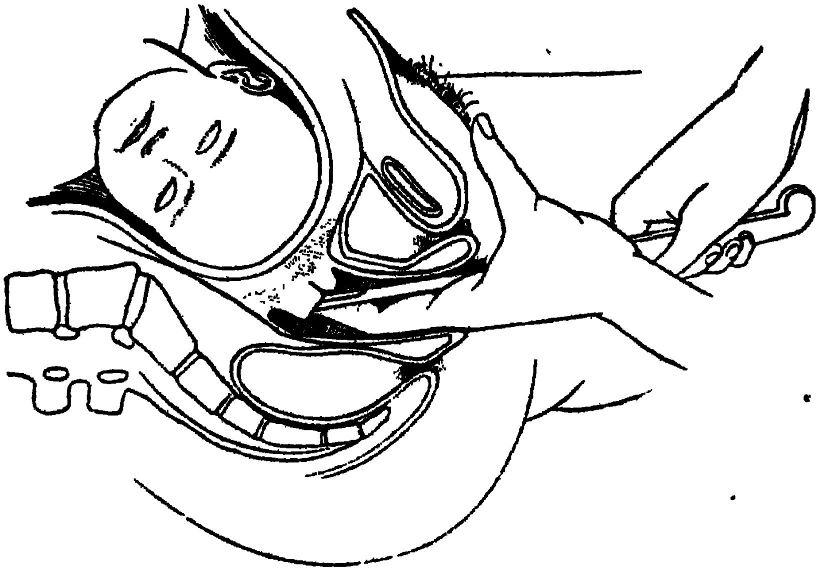


Fig. 62.—Incision of the cervix.

In incision of the cervix five or six shallow cuts are made through the hardened ring. This procedure is fraught with no danger to the child and less to the mother than when dilatation is accomplished by alternately drawing the head down and allowing it to recede. If the delay in advancement is due to lack of uterine force, this organ will often resume its energy if the patient is given a small dose of quinine,—5 to 10 grains. Should it become necessary, however, to apply forceps, the most strict aseptic precautions will be necessary. The patient should be completely anæsthetized and prepared, as has already been stated. The operator should be certain that the blades do not embrace any of the cervical tissue in their grasp. This can be prevented by recognizing the exact relation of the cervix to the child's head, and permitting the blade to enter the lower uterine segment between the fingers and the fœtal head.

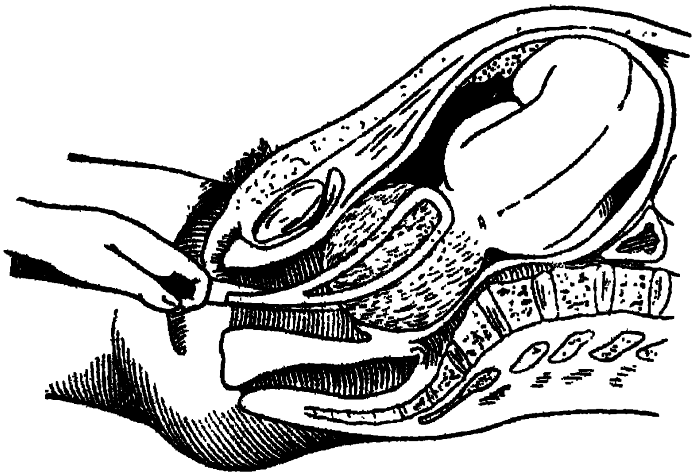


Fig. 63.—Application of median forceps.

Median forceps is usually applied directly to the sides of the pelvis (Fig. 63). Axis-traction forceps in these cases can certainly accomplish more with less force than any other instrument. (Plate XLI, A.) Although, in the majority of cases, when the forceps is thus applied, it will be found that the blades have grasped the head in its oblique diameter, yet if the grasp of the forceps is frequently relaxed the injury to the child will not be great. As the head advances under the influence of axis-traction anterior rotation will probably occur, and the free mobility, which is insured by the handle of the traction rod, will permit this rotation more certainly than if the ordinary long forceps is used. In the plates correct and faulty traction is shown. (Plates XLI, B, and XLII, A.) Parallelism of the rods and handles must be maintained, and it is seen at a glance how much farther downward traction is exerted.

As soon as the head has been brought down to the floor of the pelvis the traction-rods are removed and extraction is completed even as is described under "Low Forceps." (Plate XLII, B.) If the axis-traction forceps be not at hand, and the ordinary forceps be used the operator must make traction as nearly downward as the perineum will permit, bearing in mind at the same time that the pelvic curve of the blades may be making undue pressure against the anterior aspect of the uterus. At the same time, if the handles are raised the presenting part will simply be forced against the symphysis and further advancement be prevented. Hence it will be necessary to exercise unusual patience, and at no time attempt to dislodge the head by the application of brute force.

High Forceps.—It has already been stated that while the head is movable above the brim forceps should not be applied.

In rare cases where the waters have drained away and the uterus has firmly contracted around the fœtus, rendering version impossible, simply as a tentative measure forceps may be applied.

It is needless to say that the very greatest care must be taken, or else serious if not fatal injury to the mother will result. The patient should be thoroughly anæsthetized and the entire hand gently introduced into the vagina. It must be remembered that after uterine retraction has taken place the possibility of rupture is increased and no harsh measures must be adopted. It should be the aim of the obstetrician to determine, if possible, the cause of the failure of the head to engage. If it is due to contraction of the pelvis to any marked extent, it will be useless to attempt to drag the head into and through the pelvic canal. If the true conjugate is less than three and three-fourths inches, with a normally-developed fœtus at full term, forceps should not be used.

If upon examination the pelvic canal be normal, and it is found that early loss of waters has taken place and that uterine

PLATE XLI.

A

B

A. Insertion of Left Blade A

PLATE XLII.

A

B

A. Axis-traction Forceps (Correct T[illegible])

contractions have not been of normal force, then the forceps may be applied while the head is still above the brim if version be contraindicated. As in median forceps, the cervix must be dilated before the forceps is applied. Carefully guarding the blade with the right hand, the left blade should be introduced. No force must be used, and if the blades cannot be adjusted to the sides of the pelvis without force the operation should be discontinued. If, however, they can be applied, only gentle force must be used to see if the head can be made to engage. Axis-traction forceps should be used. Should the head engage, the after-conduction of the case will be the same as in median forceps.

PROGNOSIS.

The application of low forceps should be attended with absolutely no mortality to either mother or child.

When the head has firmly engaged, yet has not descended into the pelvis, forceps, when applied under the rules of asepsis already given, should not be attended by a mortality to the mother, and, where there is no malposition or disproportion, should be alike safe to the child.

In the high operation, where the head is yet above the brim, the prognosis for both mother and child is very much less satisfactory. Extensive laceration of the soft parts and even rupture of the uterus may occur. Experienced operators hesitate before applying high forceps, realizing the great risk to the patient. The outlook for the child, on account of the prolonged compression of the head, is even more serious. Although the frequent unlocking of the blades will afford a greater degree of safety to the child, its life not only is often jeopardized, but injury to the cranium may result in fatal convulsions or epilepsy. The more frequent use of the axis-traction instrument should modify this statement materially, because of the fact, upon which stress has been laid, that less tractile force is requisite the nearer traction in the correct axis is approximated.

CHAPTER XV.

VERSION.

The term "version" applies to all operative methods for changing the relation between the long axis of the child and the long axis of the uterus.

Inasmuch as version is but another expression for turning, it also embraces the operation for converting an occipito-posterior position into an anterior one while the child is *in utero,* even though the long axes of the child and the uterus remain unchanged. By means of this operative interference the cephalic or pelvic pole may be caused to present. The breech may be changed for the head, the head for the breech, or a transverse either to the breech or head.

Again, as is stated above, the back of the child may be turned toward the abdomen of the mother. Before any operative procedure is performed it is absolutely necessary to determine the exact relationship which the child bears to the uterus; also the mechanical obstruction which is to be overcome, and an estimate of the comparative size of the child's head and the pelvic outlet must be secured.

Ordinarily this can be determined by abdominal palpation and vaginal examination, both of which methods should be resorted to. External palpation is a procedure too seldom used, and those who will accustom themselves to study every obstetrical case in this way will be surprised to see how soon experience will yield happy results. It is so very important to know just what position the child is in, that if, as is sometimes the case, it is impossible to gain the proper information from these two methods of examination, it is better to introduce the hand into the vagina and one or two fingers through the os. In this way a positive diagnosis can be made. At the same time other valuable information can be gained, viz., the absence or character of the pulsation of the cord; the low implantation of the placenta, if such be the case; the normal or otherwise prominence of the sacral arch, and, in cases of slightly deformed pelves, whether or not one or both of the pubic rami encroach on the pelvic outlet. It is necessary to determine as nearly as possible all these conditions, or else there will be far too many cases of perforation of the after-coming head, with the too late realization that the case was not one on which version should have been performed. Of course, such thorough examination calls for anæsthesia.

The multiplication of terms is so prolific a source of confusion in the study of any subject, that it seems wise to reduce the nomenclature of version to such simplicity as is compatible with clearness.

Cephalic version indicates that some other position has been changed so that the head presents.

Pelvic version indicates that some other position has been changed so that the breech presents. Podalic version is a term which should be included under the head of pelvic version, inasmuch as it is but a farther step in that procedure.

Internal rotation of the child is the term which signifies that, while the long axis of the child bears the same relationship to the long axis of the uterus, the occiput has been made to undergo a half-rotation.

This changing of the fœtal relationship to the uterine may be accomplished in three ways: External, internal, or combined external and internal manipulation. Hence, to sum up this simplification of the nomenclature as applied to version, it may be taken for granted that all versions are either cephalic, pelvic, or consist in internal rotation of the child, and that the operation is performed either by external, internal, or combined external and internal manipulation.

Cephalic version has found a few advocates and, theoretically, should be performed in all breech or transverse presentations where no complications exist to contra-indicate such a procedure. Pinard, who perhaps has done more than any other to popularize cephalic version, intimates that any other than a head presentation is due to some abnormal accommodation between the head and the pelvic inlet. Granting this to be true, it would seem that this very fact would contra-indicate the operation. So rarely will the patient be able to deliver herself, even after the cephalic version has been performed, that the operation is not to be regarded as practical except in a very limited number of cases.

Almost the only condition which renders cephalic version practicable is transverse positions, where the waters have not escaped. The operation is contra-indicated in all cases where a rapid termination of the labor is indicated, when the child is not freely movable *in utero*, and in prolapse of the cord. Should the operation be determined upon in cases of transverse position, as indicated above, the combined method of Braxton-Hicks is far more likely to be successful than either the external or internal alone. Chloroform anæsthesia should be induced and the patient placed on a table which has been properly covered and protected. The operator and his assistant must exercise absolute care in cleansing their hands and arms. The patient's bladder should be emptied and a rectal enema given. The external genitals and vagina should be cleansed with soap and water by means of a brush and afterward douched with some antiseptic solution, such as bichloride-of-mercury solution 1 to 1000, or creolin solution 1 to 100. The prone lithotomy position will render the operation least difficult. The patient being in the condition of surgical anæsthesia, the operator proceeds to carefully palpate the abdomen and determine the position of the child. The operator now redisinfects his hand and, selecting the one which he most frequently uses in making vaginal examinations, introduces it into the vagina. If the os is dilated sufficiently to admit the first and second fingers, they are carefully passed through the cervix, using as little force as is possible, so that the membranes may not be ruptured. If the os is not dilated it will be necessary to gradually introduce one finger, and, as soon as possible, the second. By slowly separating the fingers as much as possible enough room can soon be gained so that the fingers can be passed into the uterus.

Should a contraction of the uterus take place the operator must desist from any manipulation in order that the integrity of the membranes may not be endangered. The fingers now seek the presenting part, and if it be a shoulder it is gradually raised and pushed toward the breech. The assistant at the same time pushes the head toward the pelvic inlet, while with the other hand the operator governs the movements of the breech, and pushes it up toward the fundus. As soon as the head impinges on the vaginal fingers it may be made to settle into the brim of the pelvis. Carefully controlling the body of the child so that it may not again assume the transverse position, the membranes are ruptured and the water is allowed to escape. This permits the uterus to contract more firmly on the body of the child, and thus retains the head in its proper position. The remainder of the delivery may now be left to nature unless some further indication presents itself.

Pelvic version is, as already stated, the term applied to the operation of converting some other presentation into a breech. It is of no advantage unless the operator goes a step farther and brings down a foot, thus performing a podalic version. This operation, considered from an elective stand-point, and not as a measure of last resort, is capable of producing more favorable results than has ever been credited to it. It is not fair to charge this operation with fatal results to mother or child when it has been resorted to only after repeated vain attempts to deliver the child with forceps, or after the mother has become exhausted by her long-continued efforts to overcome a resistance greater than the force at her disposal. In the hands of one who recognizes the difficulties to be overcome, either at the beginning of the labor or soon afterward, it becomes a powerful measure in saving lives. Podalic version is indicated (1) in transverse presentations where the child is not freely movable, or when cephalic version is not indicated; (2) in head presentations where, from some complication, the head fails to engage; (3) in cases where it becomes necessary to expedite the delivery while the head is yet above the brim of the pelvis; (4) in head presentations where the safety of the mother or the child is likely to be endangered should the head be allowed to enter the pelvic canal.

The indication for podalic rather than cephalic version in transverse presentations will be found far more frequent, inasmuch as these cases are not always diagnosed in that stage of the labor which makes cephalic version possible. If the head is still above the brim of the pelvis and *movable,* podalic version is so much less dangerous than delivery by forceps that it should be adopted. Even in the hands of the most expert the application of high forceps is fraught with no small danger to the integrity of the soft parts of the mother.

In that class of cases where it becomes necessary to expedite the delivery, such as eclampsia, placenta prævia, accidental hæmorrhage, or pressure on the prolapsed cord, podalic version is the operation which yields the very best results.

The danger of allowing certain malpositions of head presentations to enter the pelvic canal is so well known and admitted that it needs but little more than be mentioned. In face presentations and in occipito-posterior positions which cannot be corrected by internal rotation, podalic version should be performed.

Podalic version is contra-indicated (1) when the cervix is not dilated or dilatable; (2) when the uterus is in tetanic spasm around the fœtus, the membranes having ruptured; (3) when the presenting part has become so firmly wedged into the pelvic inlet that undue force is necessary to push it upward; (4) in contracted pelves when the conjugate is less than three inches and three-quarters, and in oblique contractions when the brim of the pelvis is seriously encroached upon.

Operators who disregard the first contra-indication are the ones who will most frequently be compelled to perform craniotomy on the after-coming head which has been grasped in a partially-dilated cervix. This, of course, applies when extraction immediately follows version. The combined method permits version with but slight dilatation of the cervix.

When the uterus is in tetanic spasm around the fœtus the operation is fraught with so much danger that it is not advisable. Long-continued dry labors or the injudicious use of ergot is the most frequent cause of this condition, and rupture of the uterus is too possible an occurrence.

If the presenting part has become firmly impacted the force necessary to dislodge it will endanger the integrity of the soft parts so much that the operation is inadvisable, and some less dangerous method must be adopted.

Although it is easy to turn the child in cases where the pelvis is contracted, yet the delivery of a living child is so uncertain if the conjugate is less than three inches and three-quarters that there exists a contra-indication to podalic version. Perhaps one of the most frequent causes of failure in saving the life of the child in podalic version is the neglect on the part of the operator to take careful pelvic measurements.

It is not necessary that the physician should leave his patient and seek a pelvimeter of some peculiar pattern, but it is essential that with his fingers he should form so nearly an exact idea of the true conjugate the he will be able to depend upon it. (The details for doing this have been given under the head of "Pelvimetry.")

In this, as in all other obstetric operations, it is absolutely necessary that an exact diagnosis should be made.

The operator must have a true mental picture of the position of the fœtus *in utero*. As stated under the head of cephalic version, external palpation and vaginal examination will, in most cases, render the diagnosis clear; but it is not infrequent, even in the most skilled hands, to make a mistake if these two methods alone are resorted to. If there is any doubt it is better to put the patient thoroughly under the influence of chloroform and introduce the *hand* into the vagina and two fingers into the uterus. In head presentations the ear becomes a most valuable landmark. If it is felt, it is with perfect ease that even one of no great experience can determine the position of the head. Let it be remembered that in but very few cases is there necessity for haste in making a careful examination. It is only after extraction begins that work must be rapid.

Before operating, the physician must have a *personal* knowledge that all the necessary preparations for the various emergencies which may arise are at hand.

Fluid extract of ergot and the usual restoratives,—whisky, strychnia tablets, etc.,—together with an hypodermic syringe in good working-order, should be in readiness. A perfectly clean, preferably new, gravity syringe, with an intra-uterine glass nozzle, should be filled with some mild antiseptic solution which is heated to 118° F. (Creolin solution 1 to 100 and bichloride-of-mercury solution 1 to 10,000 are as good as any.) Basins of hot and cold sterile water and a number of freshly-laundried towels should be in the room. Sterile gauze, for intra-uterine tamponade, should be cut in strips several yards long and two inches wide. Owing to the number of reported cases of toxæmia, iodoform gauze should not be used. A basin of some antiseptic solution and a new nail-brush should be in easy reach of the operator. A short-handled forceps, in case the after-coming head becomes arrested at the brim, should be sterilized. Needles, needle-holder, silk, silk-worm-gut ligatures, sponge-holders, and artery-clamps should be boiled and placed in a tray of sterilized water. The operator and his assistants must be conscientious in the details of antisepsis. If no operating-gown is at hand, a folded sheet can be made to take its place. The hands and nails are rendered clean with soap and brush and afterward by *immersion* in bichloride-of-mercury solution 1 to 1000 for at least five minutes or else in alcohol.

The patient should be thoroughly anæsthetized and transferred from the bed to any ordinary table, which has been covered with a blanket and a piece of rubber sheeting. She should be placed on her back and the buttocks drawn well over the edge of the table. The knees are to be separated and drawn up over the abdomen. Confining the knees in this position by means of an improvised crutch made by tying one end of a sheet around one of the knees, passing the sheet back of the patient's head and tying the remaining knee with the other end of the sheet will necessitate fewer assistants.

The vulva and adjacent parts should be thoroughly cleansed with soap, water, and brush, and afterward with some antiseptic solution.

The catheter should be introduced, even though the patient may have recently passed her water. It is wise for the operator to inform his assistants exactly what duty is to be performed by each. It is possible to perform this operation simply with the help of one physician and a nurse, or some one who will act in that capacity; but it is far better to have the assistance of two physicians,—one whose sole duty it will be to administer the anæsthetic, and the other to assist directly in the operation. In regard to the hand which the operator should use in performing podalic version, it should be borne in mind that if an extremity is to be grasped the palmar surface of the hand must be turned toward the abdomen of the child. If the back of the child is to the left, the left hand is to be used; if to the right, the right hand must be used. From the variableness of the position of the child, the physician should attempt to educate both hands to an equal degree of tactile sensibility.

As has been stated previously, version may be performed by three methods,—external, internal, and the combined external and internal.

Pelvic version by the external method is so seldom applicable that little need be said of it. It is not often resorted to, owing to the fact that the substitution of a breech for a head presentation is scarcely ever a desired condition. It is not often practical, inasmuch as the great majority of the indications for version presupposes the indication for rapid delivery by bringing down a foot. In transverse presentations when the waters have not ruptured, and when the breech is nearer the pelvic brim than the head, it may be indicated. While it may be in its performance absolutely without danger to the mother, it must be remembered that it may put the cord to such a disadvantage that the child's life will be jeopardized.

If this method is decided upon, the patient should be placed upon her back with her knees drawn up so that the abdominal walls will be relaxed. The operator stands to the side of and facing the patient. The exact position of the child should be mapped out. The physician then places one hand over the buttocks and the other over the head of the child, and, by pulling the buttocks toward him and pushing the head up, he attempts to convert the position first into a transverse and then into a breech presentation. If the presentation is already a transverse, and the breech is nearer the brim, the head may be raised as the breech is forced into the pelvis. It is necessary that manipulations be made only during the *interim* between pains, and during the contractions of the uterus an attempt should be made only to retain the amount of advantage gained. This method presupposes relaxed abdominal walls, unruptured membranes, and free mobility of the child.

The combined method made so famous by the name of Braxton-Hicks, who perfected and popularized it, is likewise limited in its application, inasmuch as it is not often successful, unless the liquor amnii is still present or has only recently escaped, and where considerable mobility of the child is still present. It is seldom performed, since version is nearly always followed by immediate extraction, and this presupposes sufficient dilatation to admit of the entire hand being introduced into the uterus.

In certain cases of placenta prævia where hæmorrhage is taking place before the cervix is very much dilated, the combined method is of great advantage. In such cases the prime object is to control the hæmorrhage, and if the operator can succeed in introducing even two fingers into the uterus he may be able to draw down a foot and thus plug the cervix with the buttocks. The operation is not easy or advisable if the head is wedged in the pelvis, nor when the uterus is contracted around the child. The patient should be thoroughly under the influence of the anæsthetic and the buttocks drawn over the edge of the table, as has been described.

After thorough asepsis on the part of the operator and his assistants and of the external genitals and vagina of the patient, the entire hand, which has previously been dipped into 1 to 100 creolin solution, and corresponding to the position of the occiput, folded upon itself cone-shape, should be introduced into the vagina. All force imparted to the hand should be gentle and at first directed downward and backward, then forward and upward, till the cervix is felt.

Counter-pressure with the unemployed hand can be made over the fundus of the uterus by the operator better than any skilled assistant can do it for him. This counter-pressure answers two purposes: the vaginal attachment to the uterus is not put on an undue amount of strain and the cervix is forced nearer the examining finger.

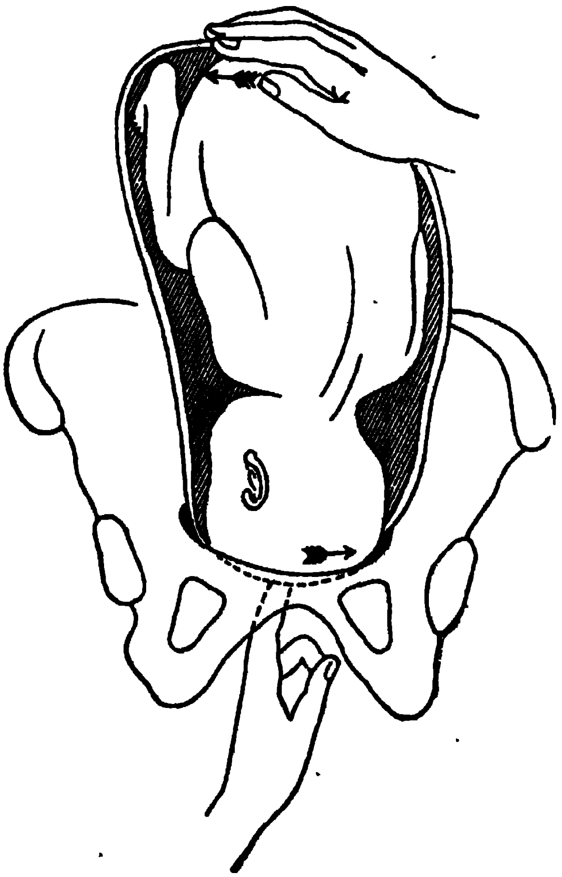


Fig. 64.—First stage of bipolar version.

If one finger only can be introduced, proceed to dilate with the index finger (Fig. 64). As soon as two fingers can be introduced the head is sought and pushed up toward the side to which the occiput is directed, while with the other hand the buttocks are brought down in the opposite direction. If extension of the head has taken place the chest of the child will be felt, which should be pushed upward in the same way as in case the head is felt. As soon as the head is raised beyond the reach of the fingers the knees are sought, since they should now be within reach. The knee must be carefully distinguished from the elbow before traction is made upon it. There will be no difficulty in doing this if the operator remembers that the flexed elbow points toward the buttocks and the flexed knee points toward the head. It is not necessary to waste time looking for the patella; it is difficult to recognize, and the above rule is accurate. If the knee is felt, it should be grasped (Fig. 65) between the two fingers and brought still lower toward the brim; at the same time the other hand can now be used to push the head toward the fundus. As the knee is brought down the fingers can be made to slip down the leg until the foot is grasped and extracted (Fig. 66).

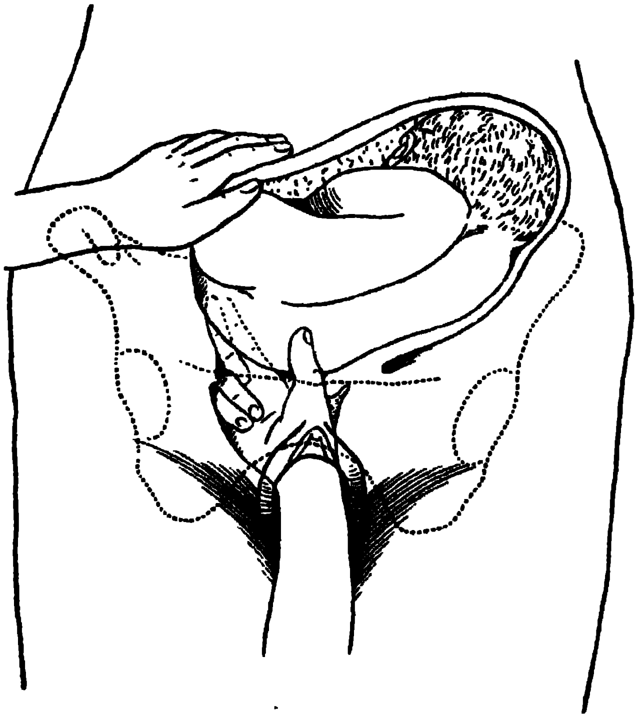


Fig. 65.—Grasping the knee.

It sometimes happens that the foot is felt before the knee;

if so, the position of the great toe and the malleoli will enable the physician to distinguish the foot from the hand. If the foot is felt and recognized it should be brought down, thus completing the version.

It has already been said that the external method and the combined method of Braxton-Hicks are limited in their applications.

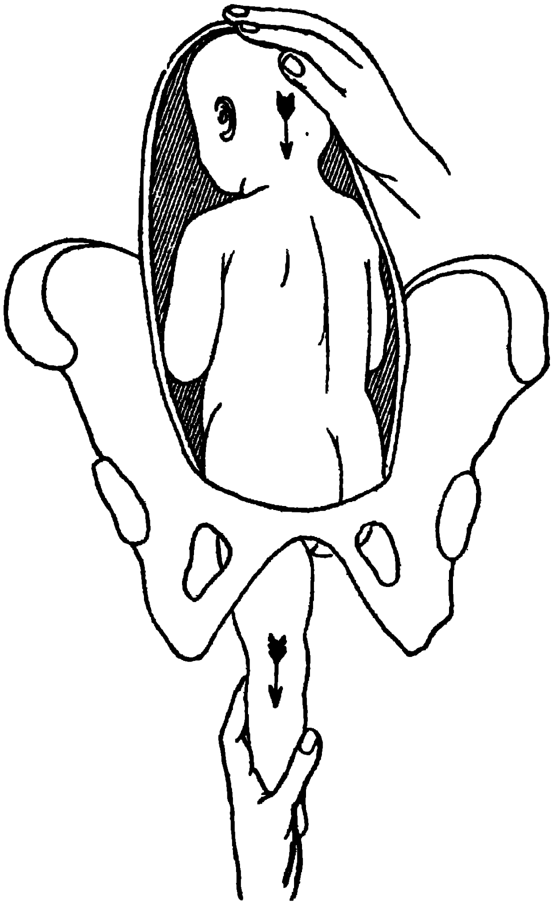


Fig. 66.—Representing first act of extraction.

It is the internal method which has the broadest field of application, and which is of incalculable value in certain cases.

The indications and contra-indications have already been given. The position of the patient and the previous preparations are the same as in the external method. This operation should not be performed until the cervix is fully dilated or dilatable. Under thorough aseptic precautions the hand is introduced into the vagina very gently, until the cervix is reached. If the cervix is not dilated, its dilatation should be at once begun. By introducing one finger into the cervix it is easy to determine whether any constricting ring exists around the os. If such is found to be the case, it may be necessary, in case of urgency, to expedite the dilatation by using the knife. Until Dührssen advocated the method we describe it was the custom to make a number of superficial incisions, and these either did not assist in dilatation at all or else during delivery the incisions became tears extending often into the broad ligaments, and the resulting hæmorrhage required ligation of the uterine arteries. Under the Dührssen method, on the other hand, the incisions are deeper, extending through the vaginal portion of the cervix to the lower uterine zone, or cervico-vaginal attachment. The cervical zone dilates at once completely, and during delivery no further tear occurs. It is simply the difference between incomplete and complete (deep) incisions. Either the guarded bistoury or the blunt-pointed scissors may be used. Under surgical asepsis and anæsthesia, the woman being in the lithotomy position, the cervix is dilated digitally until the internal os has merged into the lower uterine segment, and then, guided along one or more fingers, the bistoury is carried into the vaginal portion of the cervix and pressed through to the cervico-vaginal junction. This step is repeated in four to six directions, when the resistance is overcome. After delivery hæmorrhage may be checked by suture; but ordinarily, if asepsis has been thorough, the incisions heal by first intention.

It should be remembered that the emergency is rare where the Dührssen method is called for, since a cervical ring which will not yield to digital dilatation very uncommonly offers. During these steps—dilatation and, where necessary, incision—great care is requisite to avoid rupturing the membranes.

This procedure of manually dilating the cervix, while simple, is sometimes most trying on the operator's powers of endurance, and he may be forced to delegate a part of its performance to his assistant. The hand should be redisinfected with creolin solution

1 to 100, which at the same time takes the place of other lubricants, whenever there is occasion to introduce it into the vagina.

When the os is fully dilated the operator should pass that hand which corresponds to the position of the occiput (right hand if the occiput is turned to the right) into the uterus, and move it upward until the neighborhood of the foot is reached. The membranes are then ruptured high up instead of at the level of the lower segment. The advantage gained is that more water remains, and this facilitates the version. The movements of the hand must be gentle and *between* pains. If a contraction of the uterus should take place, the hand must be flattened out and held perfectly still until it has subsided. The head is pushed to one side and a foot

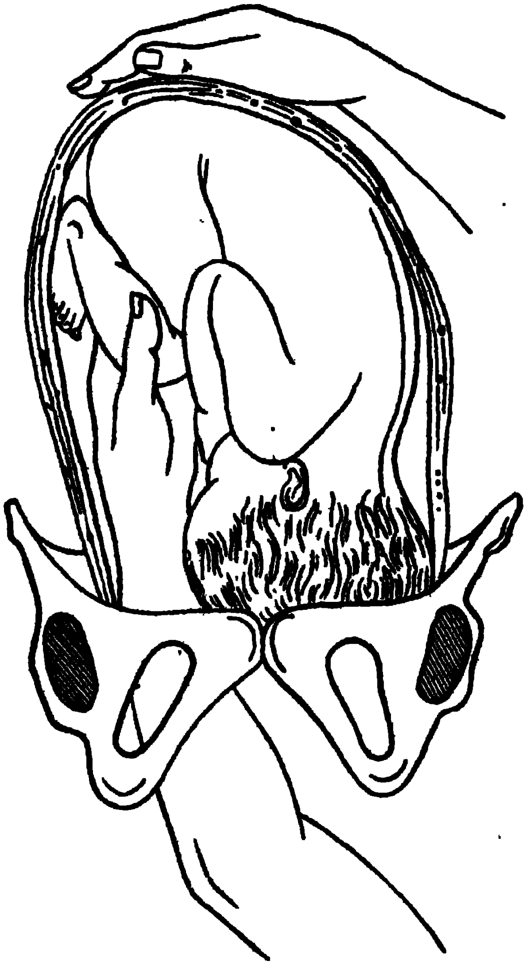


Fig. 67.—Version in head presentation.

is sought, and as soon as it is recognized it should be grasped (Fig. 67). Before traction is made on the foot it is wise to note whether the cord is looped over the leg; if so, it must be released. While the cord is between the fingers its pulsations should be noted as regards their frequency and character, for this may give the operator additional reason for hastening the delivery.

As the foot is drawn down the other hand is placed over the fundus and makes counter-pressure. It should be the duty of the assistant to govern the movements of the head, and as soon as the operator makes traction on the foot he should attempt to carry the head in the opposite direction.

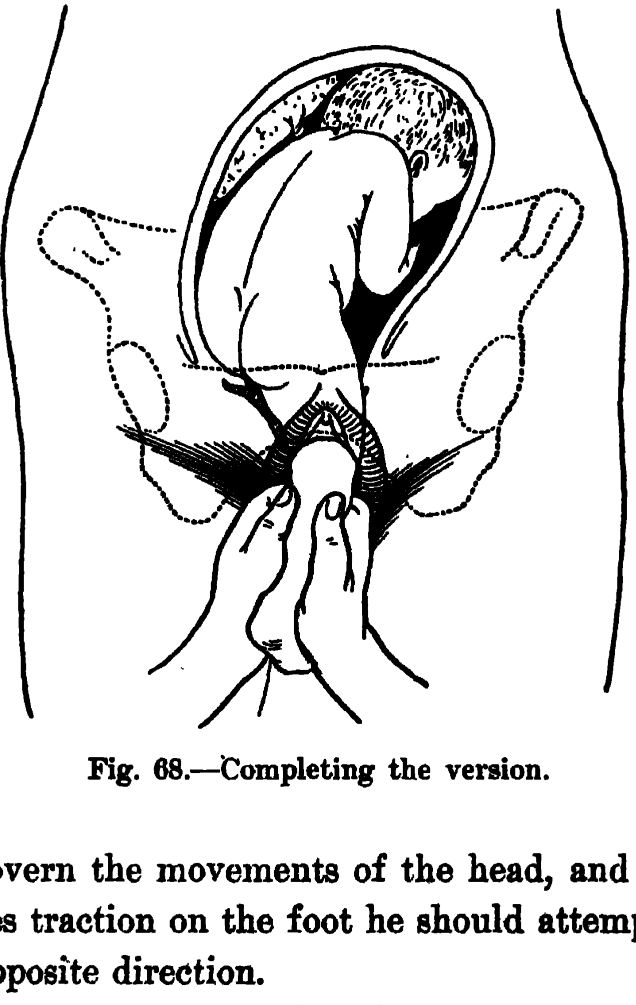


Fig. 68.—Completing the version.

As the operator draws the foot down into the vagina, the head ascends to the fundus and the version is completed (Fig. 68).

In transverse presentations, if there is no prolapse of the arm, the same method is to be adopted for performing version as has been described above, except that, as the head is already above the brim, a foot is sought at once.

In cases where the arm has prolapsed, but has not become impacted, it can be pushed up with but little difficulty. It is well, however, while the arm is still in reach, to fasten a loop of tape around the wrist before it is pushed up. This will be of assistance during the extraction, for, by drawing gently on the tape, at least that arm will be prevented from becoming extended.

In those cases where the arm has become prolapsed and long-continued uterine contractions have taken place, the thorax may have become wedged into the pelvic outlet. It must be borne in mind that here it will be necessary to replace that part which last came down before the arm and shoulder can be replaced (Fig. 69). The thorax must be carried up above the brim before any attempt is made to replace the arm. This procedure requires the greatest care on the part of the physician, or else a ruptured uterus is almost certain to result. If, after making well-directed pressure from below with firm counter-pressure over the fundus, the impaction cannot be relieved, it is better to discontinue the efforts to perform

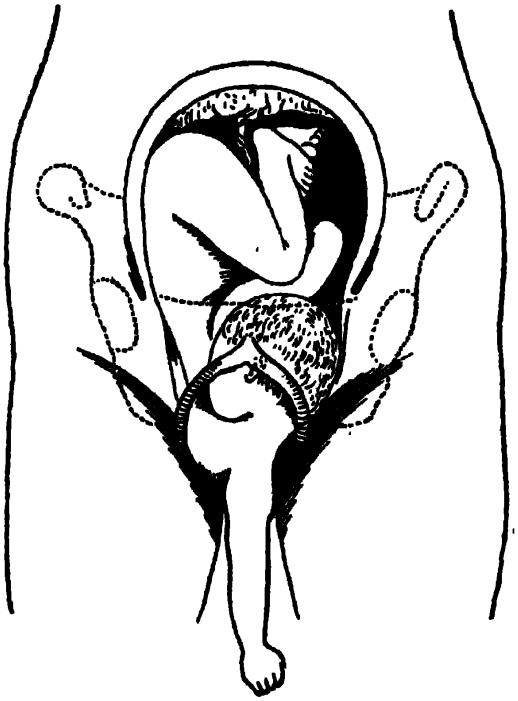


Fig. 69.—Impacted shoulder.

version, and either do embryotomy in the interest of the mother or, if the mother be in good condition and consents and the outlook for saving the child is not too poor, resort to symphysiotomy.

The indications for version almost always presuppose immediate delivery.

Much has been written on the subject: "Which foot should be drawn down?" If there is no immediate reason for haste and the operator has time to make his selection, it would seem that it is best to draw down that foot which is nearest the anterior surface of uterus. In actual work, however, it does not make much difference which foot is brought down. That one is usually best which can be soonest recognized and most firmly grasped (Plate XLIII, A).

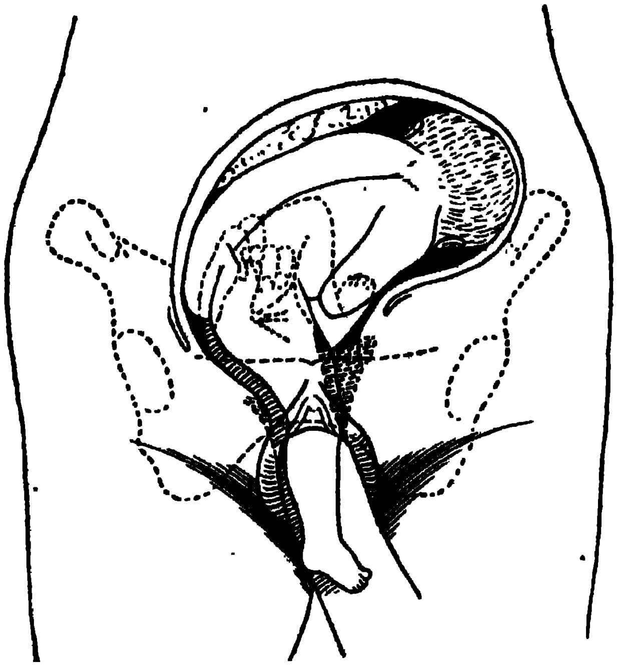
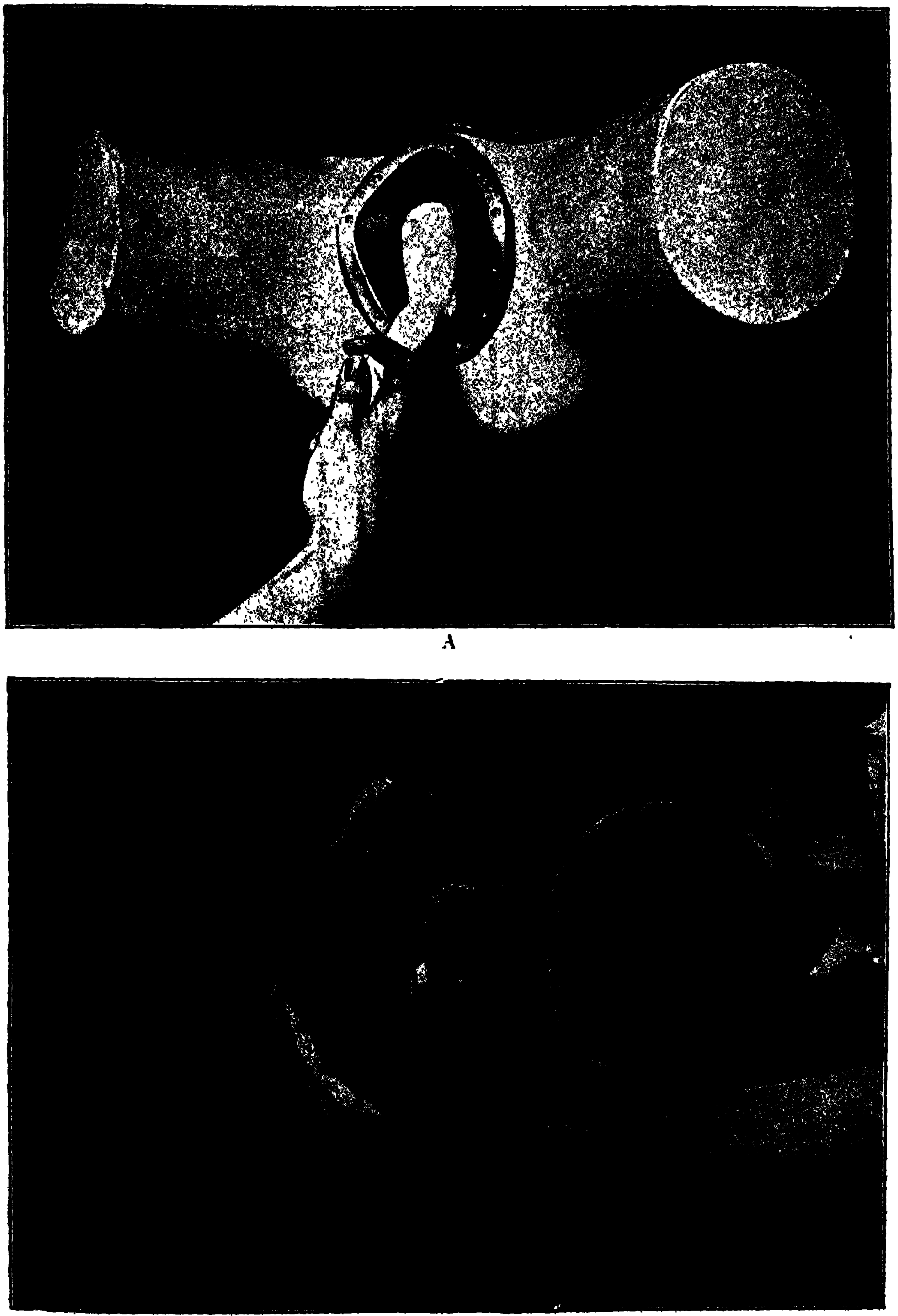


Fig. 70.—Introduction of the left hand to bring down the posterior (left) leg.

It is better, in primiparæ certainly, and often in multiparæ, that one foot only be brought down, for the cervix which has permitted a half-breech to escape will be less likely to grasp the after-coming head than if it has been dilated by the pelvis alone. If, however, traction on one leg does not prove successful, it will be necessary to draw down the other (Fig. 70 and Plate XLIV). As

PLATE XLIII.



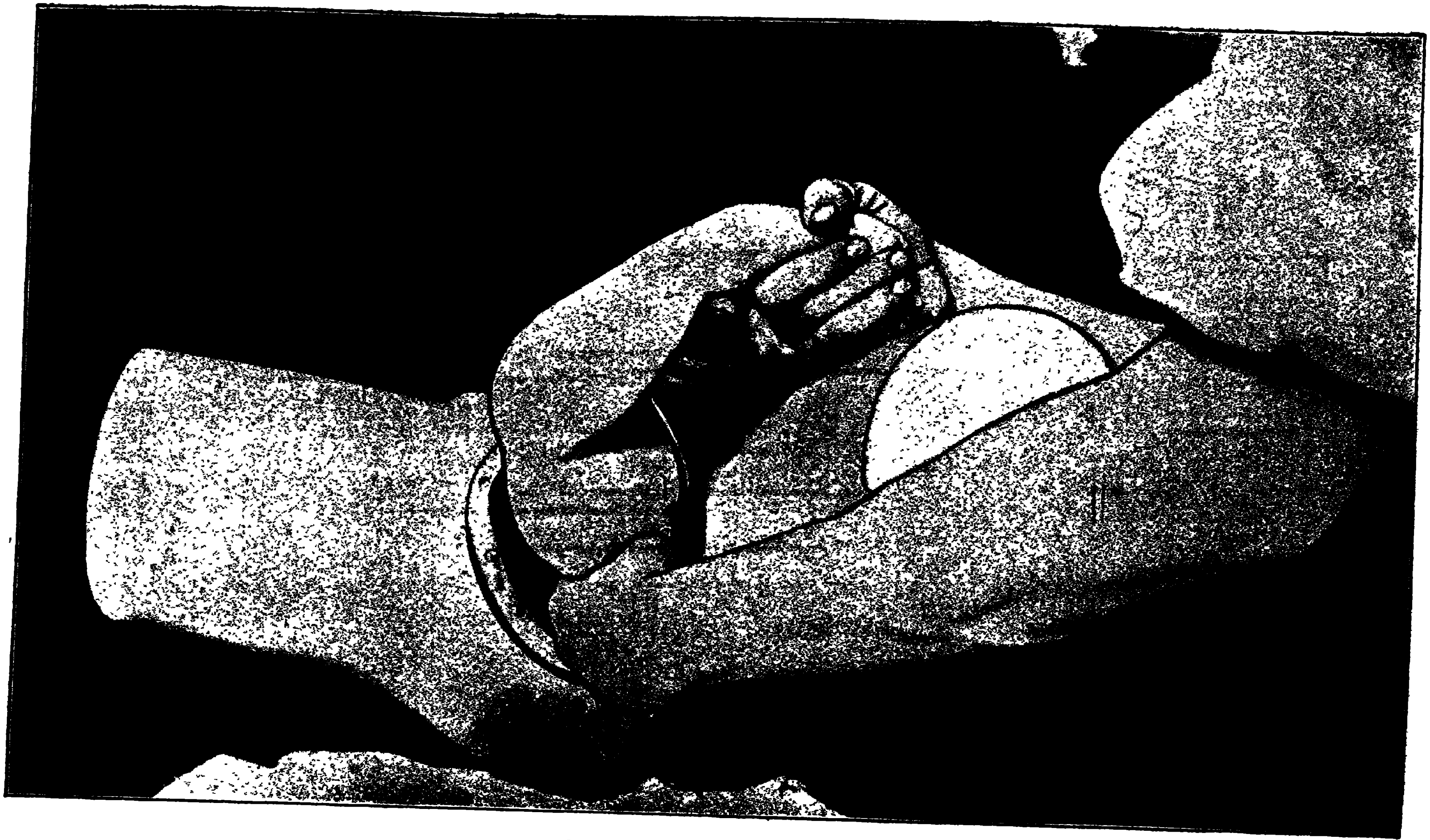
A

B

A. Showing Method of Grasping the Foot.

B. Extracting the [illegible]

PLATE XLIV.



Extracting the Posterior Leg.

the foot emerges from the vulva it is to be wrapped in a warm towel, which not only offers a better grasp on the part, but also tends to prevent the cool air of the room from causing enough reflex irritation to establish respiratory efforts on the part of the child. Soon the leg can be grasped in the same way, and at this time traction is to be made in the axis of the brim downward (Fig. 71).

It is very necessary that during the entire process of extraction the assistant should make pressure in the proper axis on the child's head. This tends to prevent extension of the head and also furnishes the *vis a tergo* which the patient, by reason of the deep anæsthesia, cannot give.

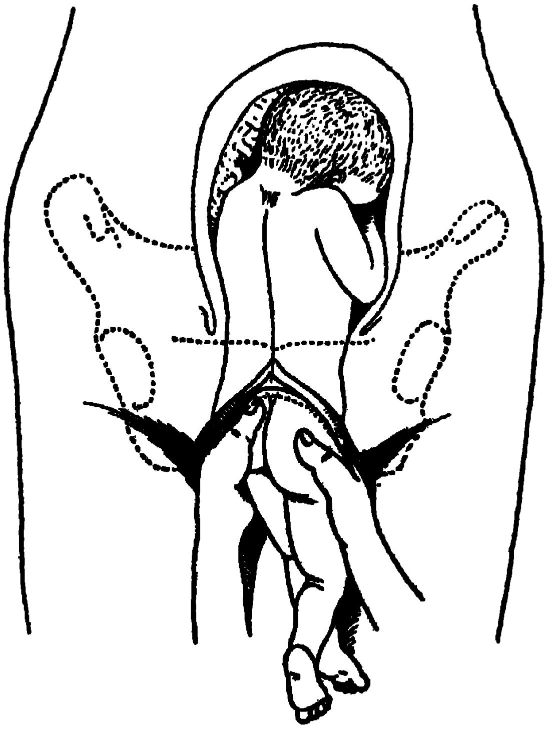


Fig. 71.—Showing direction of traction.

As the buttocks emerge from the vulva, one finger of the hand corresponding to the flexed thigh should be hooked into the groin; this will enable the operator to lessen the traction on the extended leg, and at the same time permit him to exert greater tractile force. By raising the buttocks and making traction upward the flexed thigh can be made to clear the vulva. The pelvis should now be grasped with both hands and drawn downward—again in the axis of the brim.

As the cord comes down it is to be drawn upon from the *placental* side, and if it is over one of the legs it must be released (Fig. 72) and placed in the position where it will be subject to least pressure. In rare instances it will be impossible to draw the cord down without making undue traction. If such should prove to be the case, it should be secured by means of two artery-clamps and cut. Of course, if this be done, it will be necessary to hasten the delivery as much as possible.

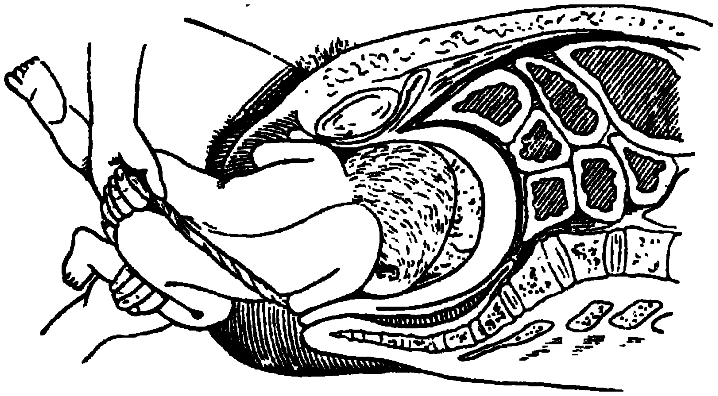


Fig. 72.—Method of releasing the cord.

When the scapulæ appear the arms must be liberated before extraction is continued. Under favorable circumstances—that is, if the assistant has kept up intelligent pressure on the fundus, or if the cervix was fully dilated previous to the version, or if the operator has not made traction in too rapid a manner—the arms will be folded on the chest and their extraction will be easy.

Even in the hands of the best operators and with the best assistants the arms sometimes become unavoidably extended. Although their extraction must be accomplished in as rapid a manner as possible, there is no need of breaking the arm if care is taken.

The arm which is to the rear is usually more easily liberated.

To do this the operator seizes the legs with one hand and carries the child's body well upward. This will cause the posterior shoulder to be more readily reached, and will permit more room for the manipulations necessary. Two fingers of the disengaged hand are passed over the back and posterior shoulder (Fig. 73). The shoulder can now be pulled down gently so that the arm may be more easily felt. As soon as the humerus is felt it is to be pushed forward and toward the opposite shoulder. Now, by drawing the humerus downward the arm becomes flexed at the elbow and the forearm rests on the chest of the child. Its extraction after this is simple, and the same as in unextended cases. If it is impossible to extract the arm in this way, the operator should pass the palmar surface of his hand over the abdomen of the child and attempt to hook one finger over the elbow of the posterior arm, and by gentle traction flex it over the chest. (Plate XLIII, B.)

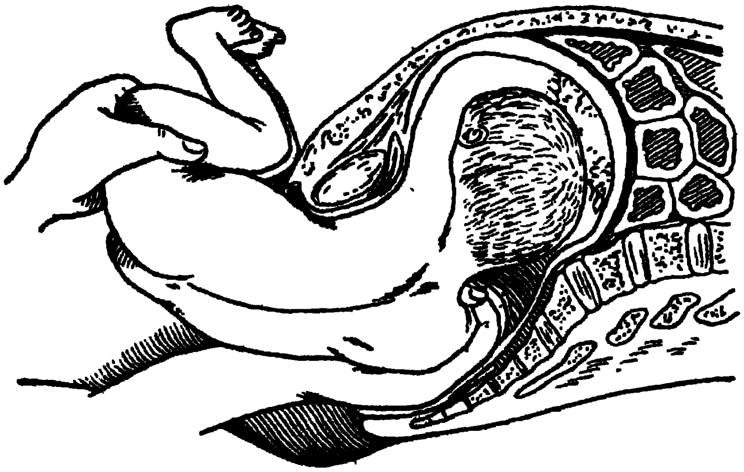


Fig. 73.—Disengagement of the posterior (right) arm.

After the posterior arm has been liberated, the child's body should be carried downward, and the anterior arm is rarely difficult of extraction. Should, however, there be any trouble in releasing it, the anterior shoulder is to be rotated to the rear, where, with more room, its extraction is simple.

With the arms released the operator hastens to extract the head.

If firm pressure has been maintained on the fundus the head should be found in the pelvis, either straight or somewhat flexed.

Extraction of the head may be accomplished either manually or instrumentally. Inasmuch as less danger to both child and mother results from manual extraction, forceps on the after-coming head should be left as a last resort.

If there be no great disproportion between the head and the pelvic outlet, extraction will not be difficult.

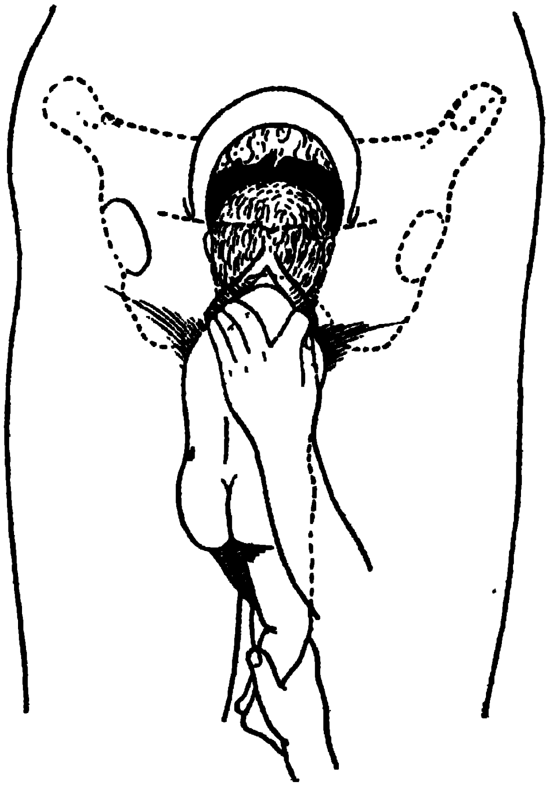


Fig. 74.—Showing direction of traction.

The child's body should be wrapped in a warm towel. Grasping the pelvis, with his left hand placed underneath the child and allowing the legs to straddle over his arm, the operator seizes the child's neck with his right hand, the palmar surface of the hand being over the shoulders of the child and the neck between the middle and third fingers (Fig. 74). Firm traction is now made almost directly downward. When the occiput has engaged immediately behind the pubic arch, the child's body is to be carried directly upward (Fig. 75). In favorable cases, the face, brow, and head will sweep over the perineum and extraction will be complete. So easy an extraction as this is the exception, however, from the very fact that those cases which demand version usually presuppose a disproportion between the size of the head and of the pelvic canal. When such is the case, other manipulations are necessary. The operator, as in the preceding method, lets the child's body rest on his left arm. The middle and index fingers of the left hand are passed into the vagina until the fingers can be applied on either side of the child's nose, the tips of the fingers resting over the malar prominences. Traction is made with this hand downward, while with the right hand the occiput is pushed upward and forward. This manipulation has the tendency to flex the head. As soon as flexion is accomplished, the operator grasps the child's neck with his right hand in the manner described above, and now with both hands makes firm and continued traction. The left hand should remain over the malar prominences, and not be introduced into the child's mouth, if firm traction is to be made with that

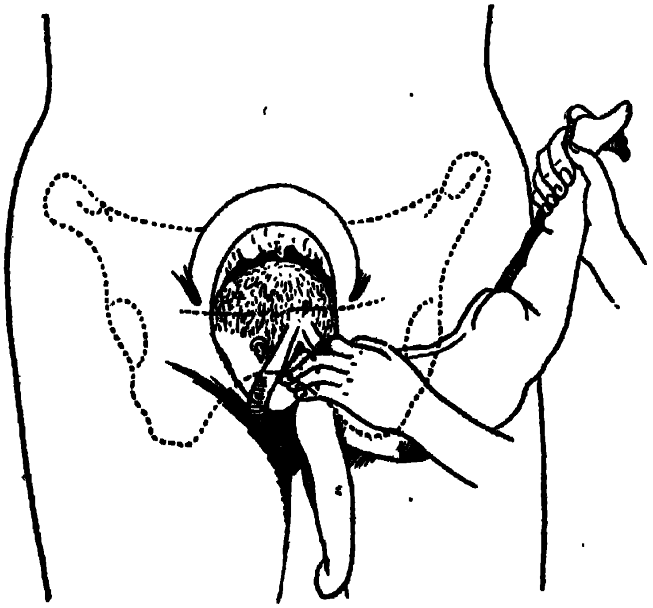


Fig. 75.—The child is lifted over the perineum and the occiput passes from under the symphysis.

hand. Traction with the finger in the mouth does not produce flexion to the same degree, and if much force is used fracture of the jaw will probably be produced. If, however, the delivery is very difficult and prolonged, if any convulsive movements of the child indicate an attempt at respiration, or if the pulsations of the cord are becoming imperceptible, a most valuable procedure is to introduce two fingers into the child's mouth, and by slightly separating them permit air to enter the child's mouth, so that respiration may be established. The right hand must now be depended upon to make the necessary traction to complete the delivery. (Plate XLV.)

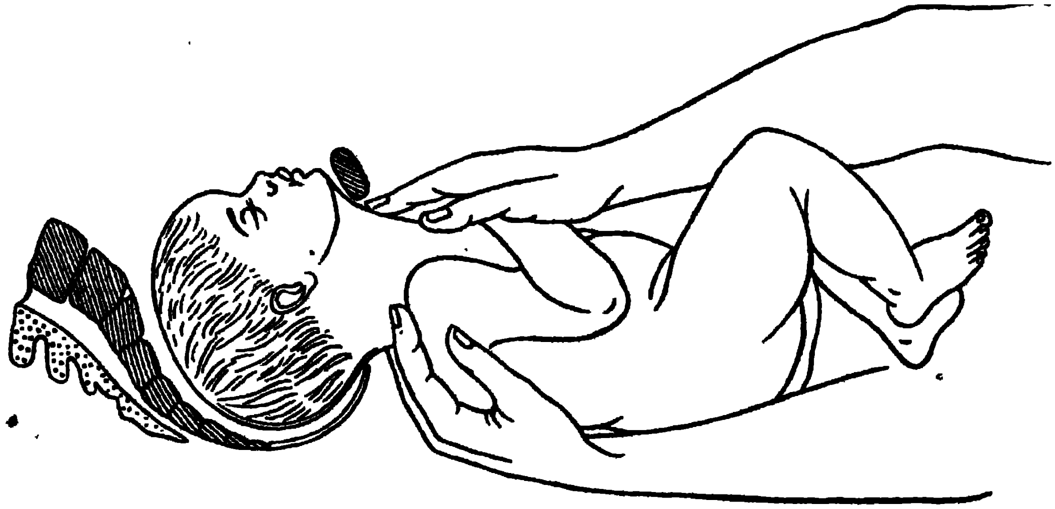
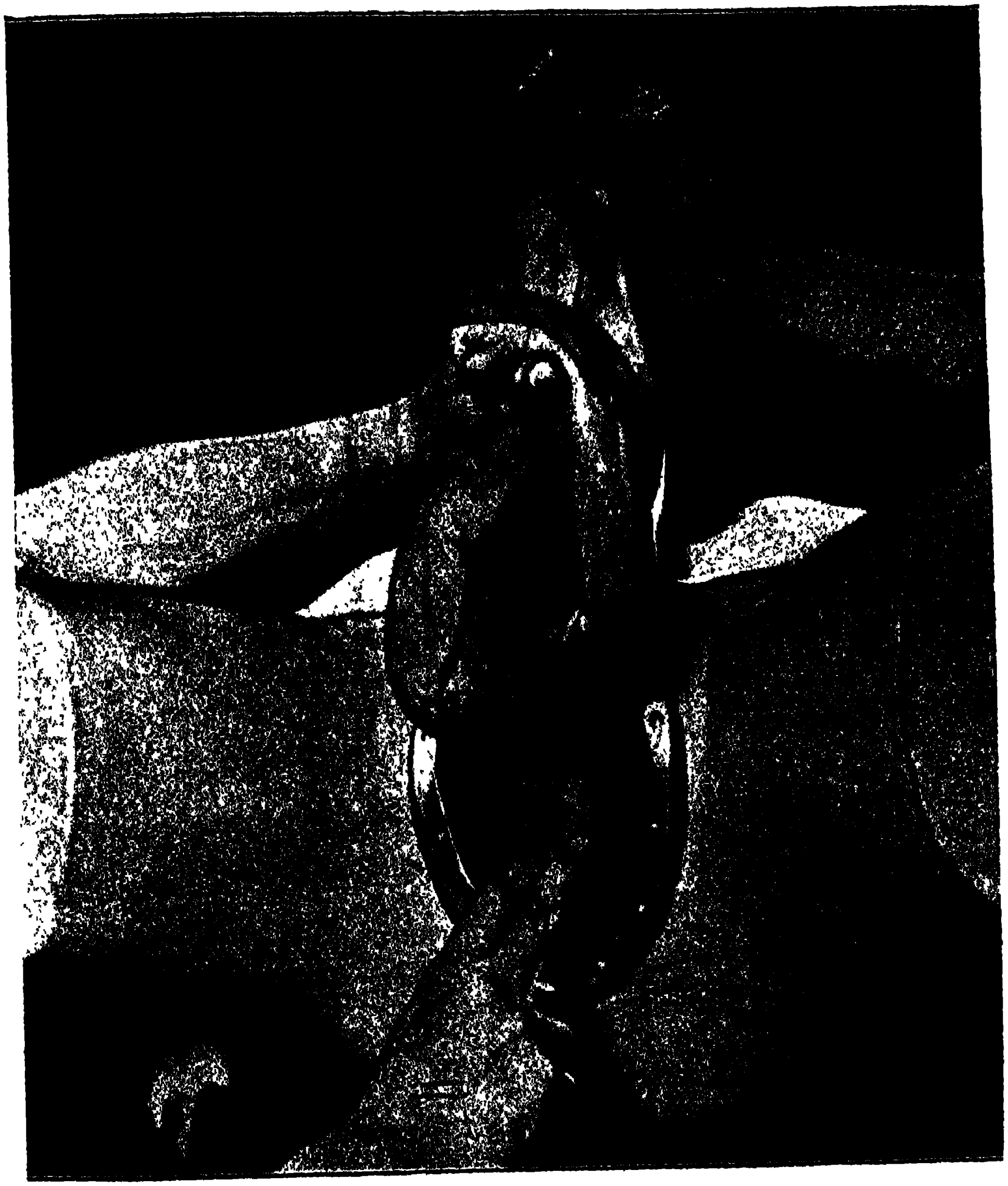


Fig. 76.—Chin arrested at symphysis.

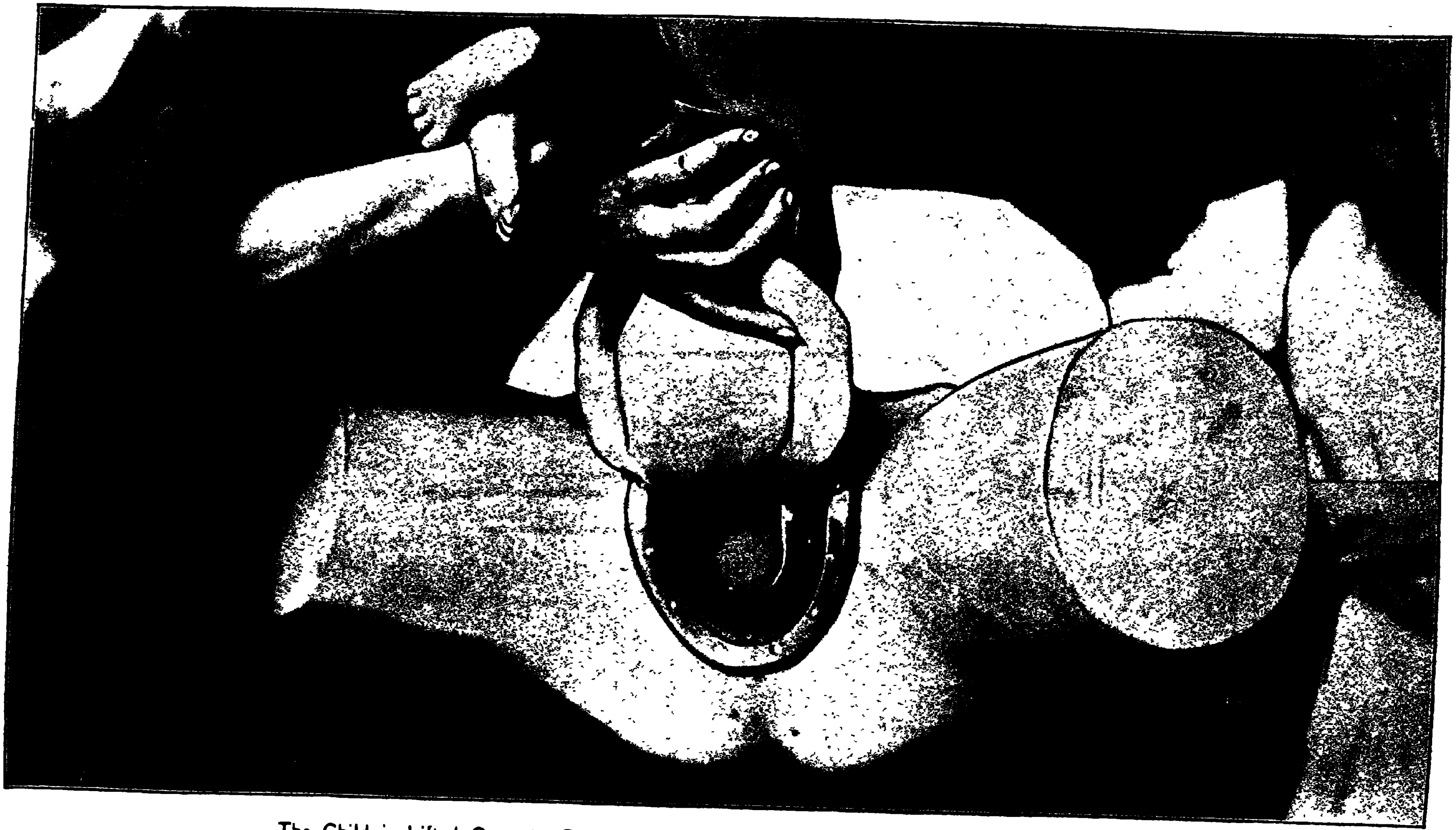
If the head become arrested at the brim, extraction is far more difficult. Here the feet must be grasped with the left hand and the right fingers placed so as to straddle the nape of the neck, and traction is to be made directly downward. At the same time the assistant makes firm pressure from above, forcing the head downward. (Plate XLVI.) Should the head fail to descend, it will often do so if it is made to enter the brim in a transverse position. To do this, the operator, in place of making traction while the back of the child is directed upward, turns the entire body of the child so that the back is directed to the side which corresponds with the shoulder that was posterior. (If the left shoulder was posterior,

PLATE XLV.



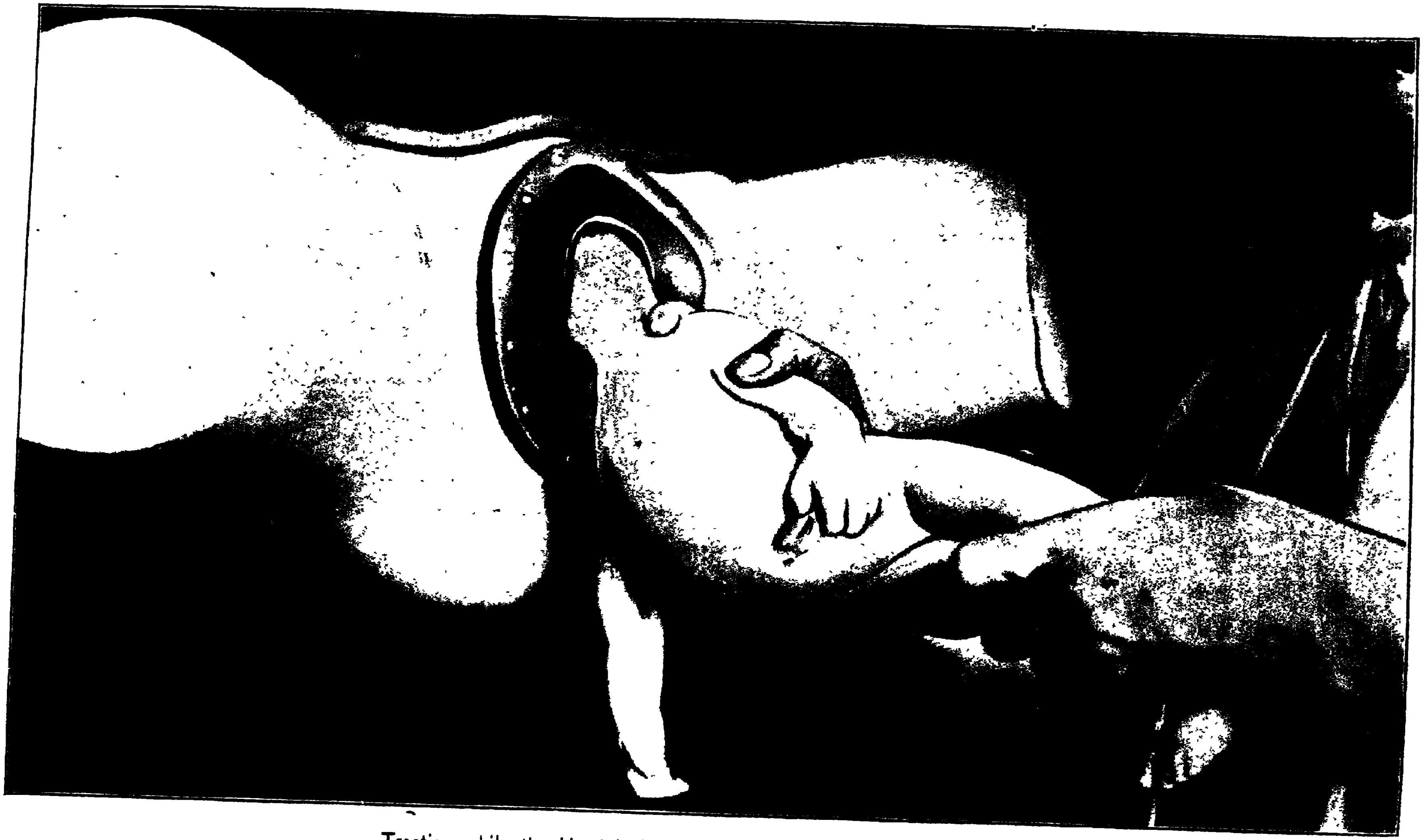
Head Impacted at the Outlet. Admitting Air that the Child may Breathe.

PLATE XLVI.



The Child is Lifted Over the Perineum and the Occiput Passes from Under the Symphysis.
An Assistant makes Suprapubic Pressure.

PLATE XLVII.



Traction while the Head is in the Transverse Diameter of the Pelvis.

the back of the child should be turned toward the left side of the pelvis.) Now, by making traction directly downward, the head will enter the brim through its greatest diameter and descend into the lesser pelvis. Traction now will usually result in the occiput turning forward, when extraction may be completed as described before.

Should the occiput not rotate forward, then the perineum, instead of the symphysis, becomes the fulcrum, and downward traction will cause the face and brow to sweep under the symphysis and delivery is completed. (Plate XLVII.)

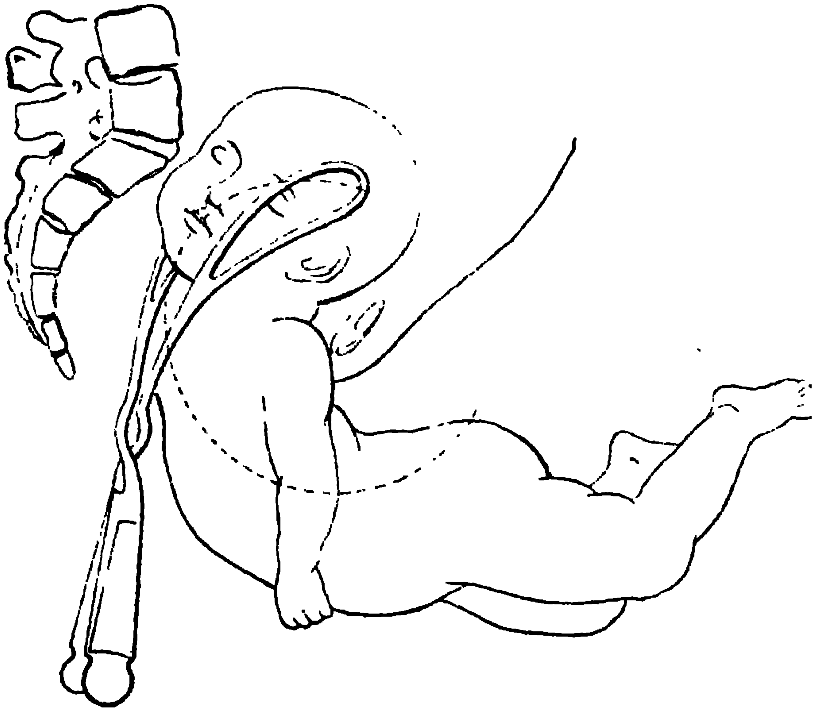


Fig. 77.—Forceps applied to after-coming head.

In case, however, extension has taken place and the chin becomes arrested behind the symphysis (Fig. 76), traction should be made upward and two fingers of one hand should be passed into the rectum and the occiput "shelled" out over the perineum.

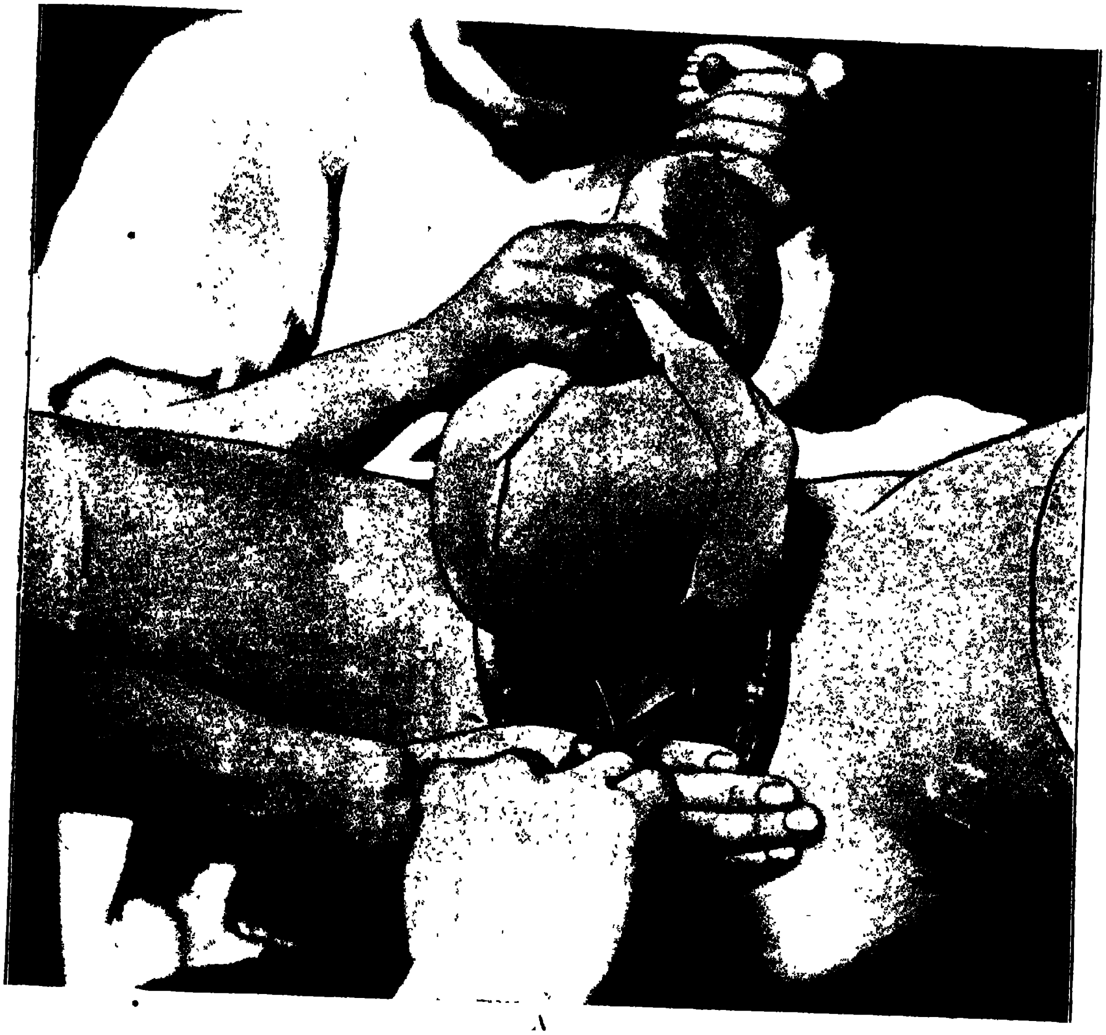
When one or another of these means has been tried and failed, forceps should be applied. The authors have obtained better results with the short-handle Hunter forceps than with any other used. Usually the forceps can be adjusted posteriorly (Fig. 77 and Plate

XLVIII, A) better and more quickly than anteriorly, but it should be applied to that aspect of the child which can be most rapidly reached. It should be applied to the sides of the pelvis regardless of the position of the child's head.

It must be remembered that after extraction of the arms the head must be delivered within three to five minutes if a living child is to be obtained. It is true that in exceptional cases a living child may be extracted within fifteen minutes, but this is very rare. Care must be exercised that the forceps does not slip during extraction, or else grave injury will result to both mother and child.

As has been stated before, internal rotation of the fœtus is an operation which must be included in the consideration of versions, for the operation consists in turning the child in its long axis. This operation is indicated only in occipito-posterior positions, while the head is yet movable above the brim. The operation should not be performed if the head has firmly engaged, nor if the waters have drained away, nor if for any reason the labor must be hastily terminated. If the waters have already drained away and the uterus is firmly contracted around the child, it will be necessary to apply forceps and hope for rotation in the descent. In the great majority of cases this rotation will ensue. If there is any reason to hastily terminate the labor, it is better to perform podalic version and extract, provided always the necessary conditions are present. An occipito-posterior position is, as a rule, associated with slow engagement, and this is often the first factor which attracts the attention of the obstetrician to the fact that the labor is not a normal one. The physician often makes his first examination in a somewhat perfunctory way,—that is, he satisfies himself that the head is presenting, and perhaps determines that the cervix is slowly dilating. If such has been his course, and if after several hours repeated examination shows but little increase in the dilatation of the cervix, or that the head does not engage even under the influence of firm uterine contractions, he should at once determine what conditions are present which are prolonging the first stage.

PLATE XLVIII.



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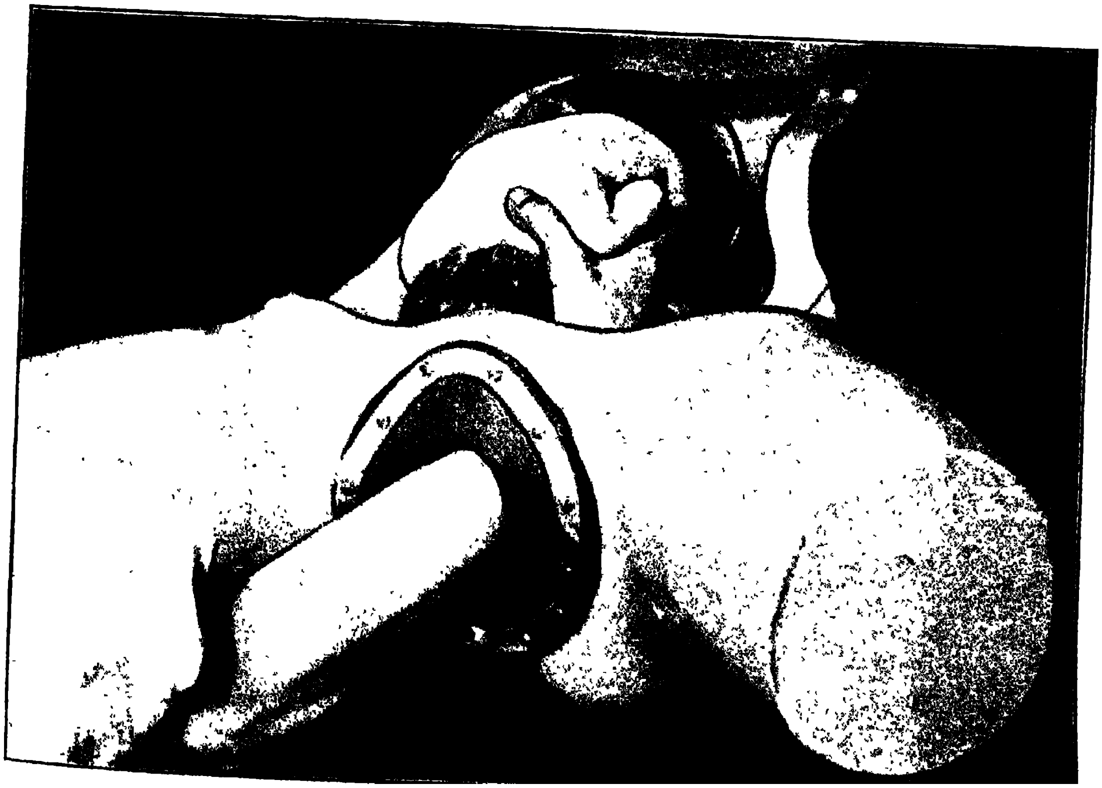


An examination with one or two fingers introduced into the vagina, even conjoined with abdominal palpation, will often not result in the information necessary to determine this point. Certainly it will not if the patient is nervous and resists the physician's efforts. An anæsthetic should be administered if satisfactory results are to be obtained from the examination.

The preparation of the patient and the operator should be the same as for podalic version. The operator introduces that hand into the vagina which he is in the habit of using when making a vaginal examination. If the cervix is dilated so that two fingers can be passed into the uterus, no further dilatation will be necessary at this time. The head should be carefully raised between pains, and no undue pressure made upon the membranes. The fontanelles are sought and examined. If any doubt of the real position remain after this, the ear should be felt; this will be an unfailing guide.

If the occiput is posterior the cervix should be dilated, preparatory to performing the internal rotation, in the same way as has been described for podalic version. With the cervix fully dilated the hand is introduced into the uterus. If the head has slightly engaged, it should be gently pushed up. The fœtus is now grasped and slowly rotated in its long axis until the occiput is anterior. (Plate XLVIII, B.) The hand should now be slowly withdrawn until the head can be grasped, and in this position the operator waits for uterine contraction. When this has occurred the head is driven down and engagement ensues. It is wise to retain the hand until two or three contractions have taken place, so that the head may be firmly engaged. The case may now be left to nature, or, if necessity demands, the forceps may be applied and extraction completed.

The course of action herein advocated is not novel, nor is it as radical as at first sight it may appear. The management of occipito-posterior positions has for a long time been a matter of strife among obstetricians. The lever, the forceps applied inversely, podalic version, the conversion into a face presentation,—

such means from time to time have been advocated. When the occiput, in faulty position, has become impacted, certain of these measures are forced upon us, with consequent damage to the woman and with as yet not sufficiently recognized injury to the fœtal brain.

For the purpose of rotation nothing can take the place of the *aseptic* hand, aside from the fact that at one and the same time the hand may detect any additional anomaly hitherto unsuspected, such as pelvic deformity, which, aside from being a further cause of slow or impossible engagement, may alter the field of election at the very best time (from the stand-point of both the woman and the fœtus),—that is to say, when the conditions are still favorable for version or some other procedure.

When the occiput rotates backward into the hollow of the sacrum, we are face to face with what—there is uniform agreement—constitutes one of the most difficult cases in obstetrics. The clean, educated obstetric hand at the pelvic brim is a source of positive safety to both the mother and child, compared with waiting until exhaustion calls for, for instance, the forceps within the pelvic brim.

A tedious first stage, characterized by short, nagging pains, is a fairly-uniform accompaniment of the instances which should cause anxiety. It seems clear that *manual* examination at this time will often lead to the adoption of a procedure which will alter the prognosis of, and lessen the difficulties attendant upon, the persistent oblique and sacro-rotated occipital position.

This procedure, which has been persistently advocated by the authors, has been much criticized on the ground, first, that internal rotation of this nature is not permanent and, secondly, that, dilatation having been accomplished and the hand being in the uterus, the wiser plan is to perform podalic version. The first objection falls to the ground in face of the established fact that over and again the manœuvre has succeeded. Those who fail simply twist the head. They do not rotate the body. The second objection carries more weight, and where the dystocia is due to the pelvis and not to the fœtus its truth is now granted. But, if the size of the fœtus added to the malposition is the cause of the tedious labor, it will be found advantageous in all instances except those of emergency to give nature a chance to dilate the pelvic canal, as also to mold the fœtal head. It is a sound obstetric rule not to interfere needlessly either by forceps or version.

PROGNOSIS.

Naturally the prognosis will vary greatly according to the conditions demanding the operation. In those cases where retraction of the uterus has not taken place, and where there exists no disproportion between the head and pelvis, the prognosis for the mother should be absolutely good if the operation is performed under aseptic precautions and in a skillful manner. The same may be said of the child if the operation is undertaken before the fœtal heart shows signs of failure. In the proportion, however, as these favorable conditions decrease will the mortality-rate of the child increase. There should be no mortality at any time for the mother unless uterine retraction has taken place, the operation being done only as a last resort, or where the pelvic outlet is markedly disproportionate to the fœtal head.

CHAPTER XVI.

SYMPHYSIOTOMY.

THE operation of symphysiotomy was first performed in the year 1777 by Jean Rène Sigault. After a protracted convalescence the ultimate result was successful, and this led other operators to test the procedure. The results, however, were not sufficiently favorable to lead to its general adoption, as shown by the fact that up to the year 1858 the operation was performed only 86 times, with the loss of 29 women and the extraction alive of 29 children. The operation thence fell into disuse until the year 1866, when it was revived in Naples by Morrisani and Novi. Outside of Italy, however, it attracted scarcely any attention, receiving but scant, if any, reference in works on obstetrics until the year 1890, when, largely through the publications of Pinard, of Paris, and Harris, of Philadelphia, the attention of obstetricians was attracted to the really beneficent results which were being secured through timely resort to it. The unfavorable results from the operation during its early years were unquestionably due to the lack of appreciation of the necessity of both asepsis and of election, and therefore our study of the operation need be based purely on the results which are yielded in modern times, when both of these factors play the chief rôle in obstetric surgery.

In 1892 Harris collated the operations which had been performed from January, 1886, up to July, 1892, as follows: 44 operations, with 1 maternal death and the loss of 4 children. Up to this time the operation had never been performed in the United States, although practical obstetricians had been giving much attention to another alternate operation having in view the avoidance of embryotomy,—the Cæsarean section. From this date on, however, as if by magic, operations were reported from various sections of the country until we are now in the position of being able to judge the operation from the stand-point of home results. Meanwhile, Pinard, in Paris, has been equally active, and the number of recorded operations has reached a sufficiently large basis to admit even of a degree of dogmatism in the estimation of the proper sphere of symphysiotomy. The inevitable result of the rapid acceptance of the operation has been, as will be noted, a higher mortality-rate,—in a measure doubtless due to the inexpertness of the majority of the operators performing their first of the kind. Further, still, in certain of the cases more accurate pelvimetry and greater expertness with either forceps or version would have proved symphysiotomy unnecessary. Some men cannot resist the temptation to make a record in any new operative field.

Indications and Limitations.—The aim of the operation of symphysiotomy is, through section of the pubic joint, to allow of separation of the symphysis, whereby the pelvic diameters are widened sufficiently to enable the delivery, *per vias naturales*, of a fœtus which otherwise would have to be sacrificed. The operation, then, is performed purely in the interests of the child, taking the place of embryotomy and displacing the Cæsarean section from the stand-point of the relative indications. Before the resuscitation of symphysiotomy, indeed, the alternative was either mutilation of the fœtus or the subjection of the woman to the major operation of abdominal section. When, therefore, symphysiotomy becomes, as it should, an elective operation, with consequent lowering of the maternal mortality-rate to *nil*, there will exist, other things being equal, no further call for embryotomy, and the Cæsarean section will be reserved strictly for cases which fall under the absolute indication. It is significant, indeed, that more than one obstetrician in Europe is already on record as claiming that the time has definitely arrived when the physician is not called upon to sacrifice the living fœtus. In the United States, however, the time is not ripe for such an extreme statement outside of maternity hospitals. In private practice the woman herself or her representative must continue to exercise the right of choice until the mortality-rate from symphysiotomy has fallen to a figure at least as low as in expert hands is associated with embryotomy.

Through experiment on the cadaver we have learned that when the pubic symphysis is cut and the knees of the cadaver are separated the pubic bones diverge, without inflicting damage on the sacro-iliac joints, to the extent of two and three-fourths to three inches. Into the opening formed in front the presenting part of the fœtus may enter and the following space is gained in the various diameters of the pelvis. The true conjugate increases to the extent of from one-fourth to one-half inch and the transverse and oblique diameters gain from three-fourths to one and a half inches. It is at once apparent how, with a fœtus of average size, this operation enables delivery to be accomplished without mutilation of the fœtus, since the gain in the pelvic dimensions applies with equal force to the types of deformed pelves most frequently met with,—the flat and the generally contracted. About the same gain in the true conjugate is yielded by placing the woman in the Walcher position; that is to say, with the thighs hanging over the edge of the bed or table. This point should be borne in mind in any case where the contraction is slight, since, if the conditions be otherwise favorable, forceps or version may succeed—especially in the flat pelvis.

The indications for the operation are as follow: The consent of the woman or her representative. The fœtus viable and the woman and the fœtus not exhausted through protracted labor. Careful precedent pelvimetry, instrumental and manual, proving that there exists dystocia which will not yield to either version or the forceps and testifying to the existence of a type of pelvis where, after pubic section, the sacro-iliac synchondroses will yield. In the generally-contracted pelvis the conjugata vera must be at least three and three-fourths inches in dimensions, and in the flat pelvis, where it will be borne in mind the transverse diameter is relatively wide, the conjugata vera may be reduced even to two and three-fourths inches if the child is below the average size. In impacted occipito-posterior positions and in irreducible face presentations.

The cervix must be dilated or dilatable. The presence of ankylosis of one or the other sacro-iliac joint must be ruled out.

Before passing to a consideration of the technique of the operation, it is well to recall briefly the structures involved in the operation and to point out the risks to which the maternal structures are subjected. In the vast majority of women at or near term there exists normally a certain amount of separation at the symphysis, provided this be not ankylosed, when, of course, the operation is *per se* contra-indicated. The operation is entirely extraperitoneal, the bladder being stripped of the peritoneum, and the urethra lying immediately under the symphysis. In certain instances, however, as Dickinson, of Brooklyn, reminds us, the peritoneum pouches downward, and there may be danger of injuring this.

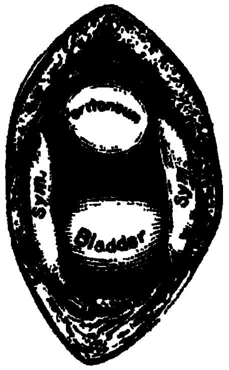


Fig. 78.—The bulging of peritoneum and of bladder into the opening at the joint. (Dickinson.)

As a rule, however, the bladder and the urethra are the only organs which are likely to be injured, and these, we will show, need not be if the requisite care is taken during the performance of the operation and afterward when the parts are brought together. We are speaking now, of course, of the suprapubic performance of the operation, the method which is favored by most practical accoucheurs. The open method of operating involves the structures and the vessels which cover the anterior face of the pubes, and the selection of this method of operating converts symphysiotomy into a much more serious operation and complicates greatly convalescence as well. The method described by Ayers is entirely different from either, as will be noted.

The two factors which control the result of this operation are *election* and *asepticism*. Where the operation is indicated it should be performed in a timely manner, and to-day there is no excuse for inattention to the stringent rules of cleanliness whereby the surgery of the present is so sharply differentiated from that of the past. If but one lesson has been taught by the results secured, it is that symphysiotomy need not have a mortality-rate. As will be noted later, the fatal cases resulting since the rejuvenation of the operation have been due either to the fact that the operation has been performed on an exhausted woman, or else, because, through inattention to asepsis, the woman has succumbed to septicæmia.

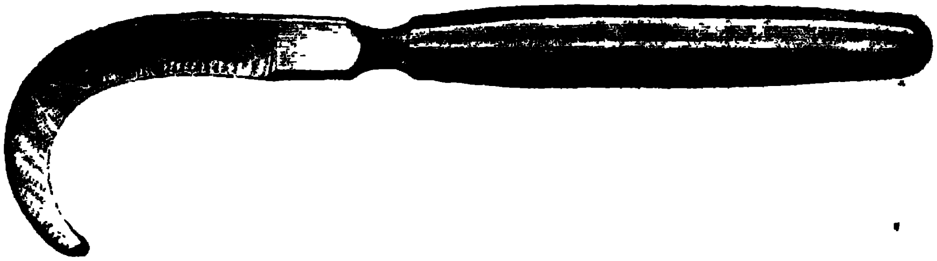


Fig. 79.—Galbiati-Harris knife. (Harris's modification.)

The instruments essential for the performance of the suprapubic operation are: a stout, blunt-pointed bistoury, a few artery-forceps, a needle-holder, needles, a metallic catheter, or a metal sound. Silk-worm gut forms the preferable material for sutures. The Galbiati knife, which is highly favored by the Italians, has been found unnecessary. Indeed, in certain cases, the use of this instrument is dangerous to the integrity of the maternal parts, if resort to it be at all possible.

In certain exceptional instances the symphysis of the pubes deviates from the midline, and in others the union of the halves is not cartilaginous, but bony. When this untoward complication is present it will be impossible to separate the symphysis with a knife, and a chain-saw is requisite. Fortunately, this occurrence is a rarity; still, the physician should be prepared for every emergency, and, therefore, should add a saw to his armamentarium.

Technique of the Suprapubic Operation.—The method of operating which is favored by the vast majority of those who have had practical experience is the suprapubic one. There are weighty reasons why the open methods (along the anterior face of the pubes) should be rejected. If this is selected it will be very difficult to avoid infecting the wound with lochia during convalescence, and, further, the tissues near the clitoris are peculiarly vascular,—all the more so during pregnancy,—and section made in this neighborhood exposes the woman to the risk of considerable hæmorrhage of a type very difficult to control. There are a sufficient number of modern instances of the operation on record now, where the suprapubic method was followed, to prove its perfect feasibility, and in certain cases its wonderful simplicity. Although trained assistants are helpful, their presence is not strictly requisite.

The woman having been anæsthetized, the abdomen is prepared as for an abdominal section,—that is to say, the pubes are carefully shaved and thoroughly disinfected. The bladder is emptied. An incision is made in the midline down to the recti muscles, beginning at the suprapubic eminence, and extending upward for about three inches. The recti are separated by the finger and the handle of the scalpel, and this brings us to the retropubic space. A catheter is now inserted into the bladder and handed to an assistant to depress the urethra from under the pubes. This is a highly-important step, since one of the accidents associated with the performance of symphysiotomy is injury to the neck of the bladder. The accident is entirely avoidable, and much depends, therefore, on the assistant who holds this catheter. The operator's index finger is next inserted under the symphysis to further protect the bladder, and it must be held there until the section of the pubic symphysis is completed. If the fœtal presenting part has not as yet engaged, or, in case it has, if the part can be pressed upward, the inserting of the finger is easy, and there remains further space for the Galbiati knife if the operator prefer it; but in case of engagement of the fœtal part it will be found difficult to insert the finger, and, this accomplished, there is scant room, if any, for the sickle-shaped knife. Hence the reason why later operators have discarded this knife and substituted the stout, blunt-pointed bistoury. The finger being in place below the symphysis, the union of the pubic bones is incised in the direction from below upward and from within outward. The operator must not be satisfied until he has severed the inferior ligament of the pubes. If he fail to accomplish this the pubic bones simply separate at the top, and there is scant gain, if any, in the pelvic diameters. As soon as the subpubic ligament has been severed, the pubic bones separate and the pelvis becomes enlarged. As already noted, a separation of from two and one-half to three inches is possible without inflicting damage on the sacro-iliac synchondroses. In order to avoid separation beyond this, an assistant on either side of the woman should make firm inward pressure on the trochanters whilst delivery is being effected.

Any hæmorrhage occurring during the steps of the operation should, if arterial, be checked by torsion or ligature. Venous oozing, which is apt to be considerable, is met by the tampon with sterilized gauze. This tampon is left in place until delivery has been effected.

It has been claimed that after division of the symphysis delivery should be left to nature, except in instances where the condition of the woman or the fœtus requires hasty action. There is, however, no advantage in this. The cervix being dilated or dilatable, since the woman is under anæsthesia, there is nothing to be gained by delay. If the head is above the brim, the membranes unruptured, or if the presenting part has just engaged and the membranes are intact, the conditions favorable for version are present and there is no valid reason why the physician should not proceed to deliver after this fashion. The chances are that the operation of symphysiotomy has been called for on account of maternal or of fœtal dystocia, and under such condition, where version is possible, it should always be elected over the forceps. Where the presenting part has engaged, but cannot be delivered short of symphysiotomy, owing to contraction of the outlet, the forceps should be applied *lege artis*. If the operation of symphysiotomy has been elected to enable the delivery alive of a fœtus presenting in a mento-posterior or in an occipito-posterior impacted position, then, after symphysiotomy, the malposition should be corrected as far as feasible, and delivery be effected by the forceps.

After completion of the third stage of labor, the operator should turn his attention at once to the repair of the wound made necessary by the symphysiotomy. The aseptic catheter is again introduced into the bladder and handed to an assistant in order that the urethra and the bladder may be pressed downward carefully whilst the pubic bones are being brought into apposition. This step is a most important one. If neglected, or if carelessly performed, the bladder or urethra will be nipped in the symphysis, and in the course of a few days a fistula will be established. The thighs of the woman are rotated inward, and firm pressure is made on the trochanters by two assistants. The pubic bones are thus brought together, and are held there until the wound in the abdomen has been properly sutured and the bandage has been applied. It is useless to attempt to suture the symphysis. Nor is this necessary. Where the operation has been performed aseptically, and a proper bandage is applied, the pubic bones will remain in apposition and unite firmly. Unless the woman is specially fat, deep silkworm-gut sutures will suffice for bringing together the abdominal wall. If the woman is stout it is preferable to unite the fascia of the recti muscle by a running catgut suture and to treat the skin and fat by the open method, which insures, in such cases, firmer union. After the sutures are in position and the usual dressing has been applied, a wide strip of adhesive plaster, extending from the trochanters nearly to the umbilicus, is carried around the woman, whilst the assistants are maintaining firm pressure on the trochanters. This immobilizes the pelvis efficiently, and, barring indication of suppuration in the wound, this dressing need not be changed for from five to ten days. The Ayers apparatus, if obtainable, is very useful. (Plate XLIX.) The after-treatment of the case is exactly similar to that which holds for the normal puerperium, except that very likely it will be necessary to catheterize the woman. The woman should be kept on her back for the first week, but after this period she may lie on her side. She should be kept in bed for at least three weeks, although cases have been allowed to rise sooner with apparently no bad effect. As a rule, in every woman, after symphysiotomy there will exist, for a variable interval, a greater or less degree of motion at the joint, but we question if this is

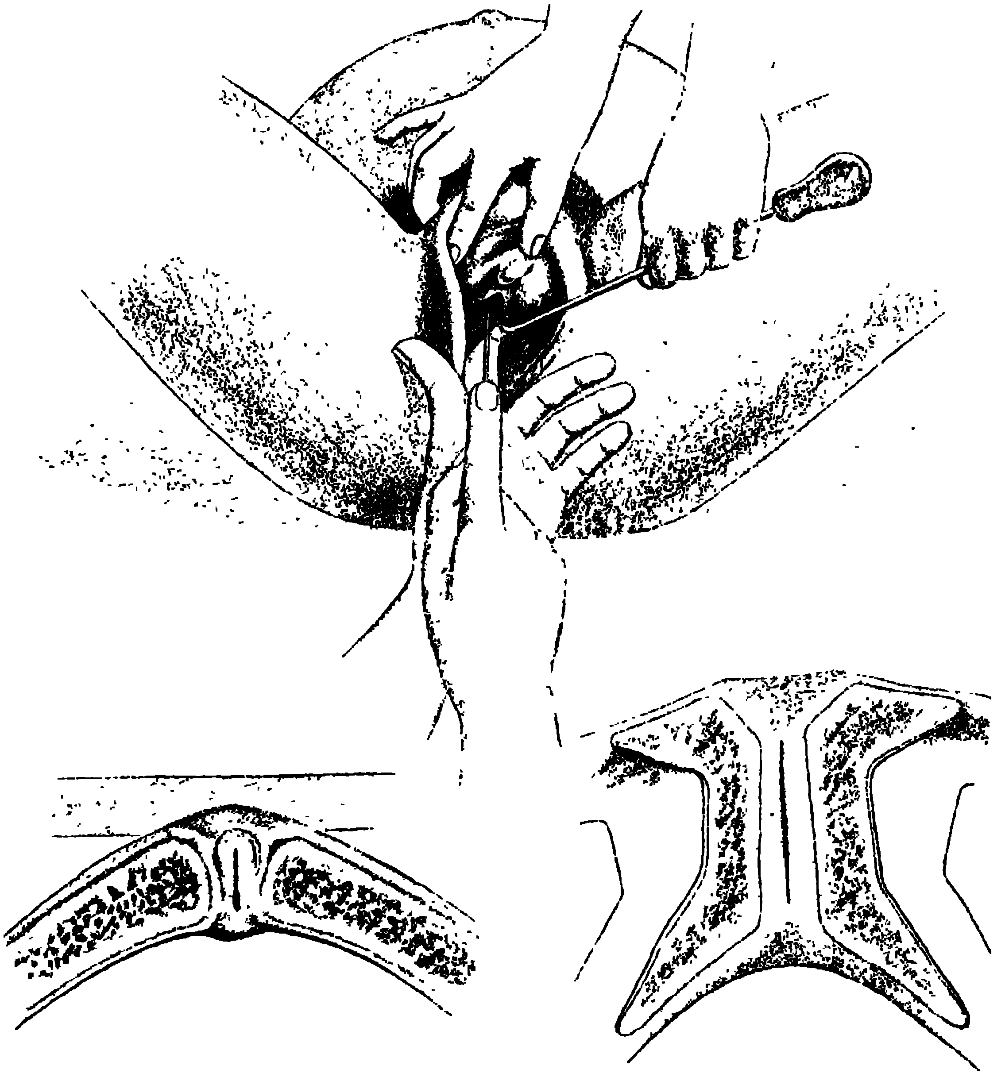
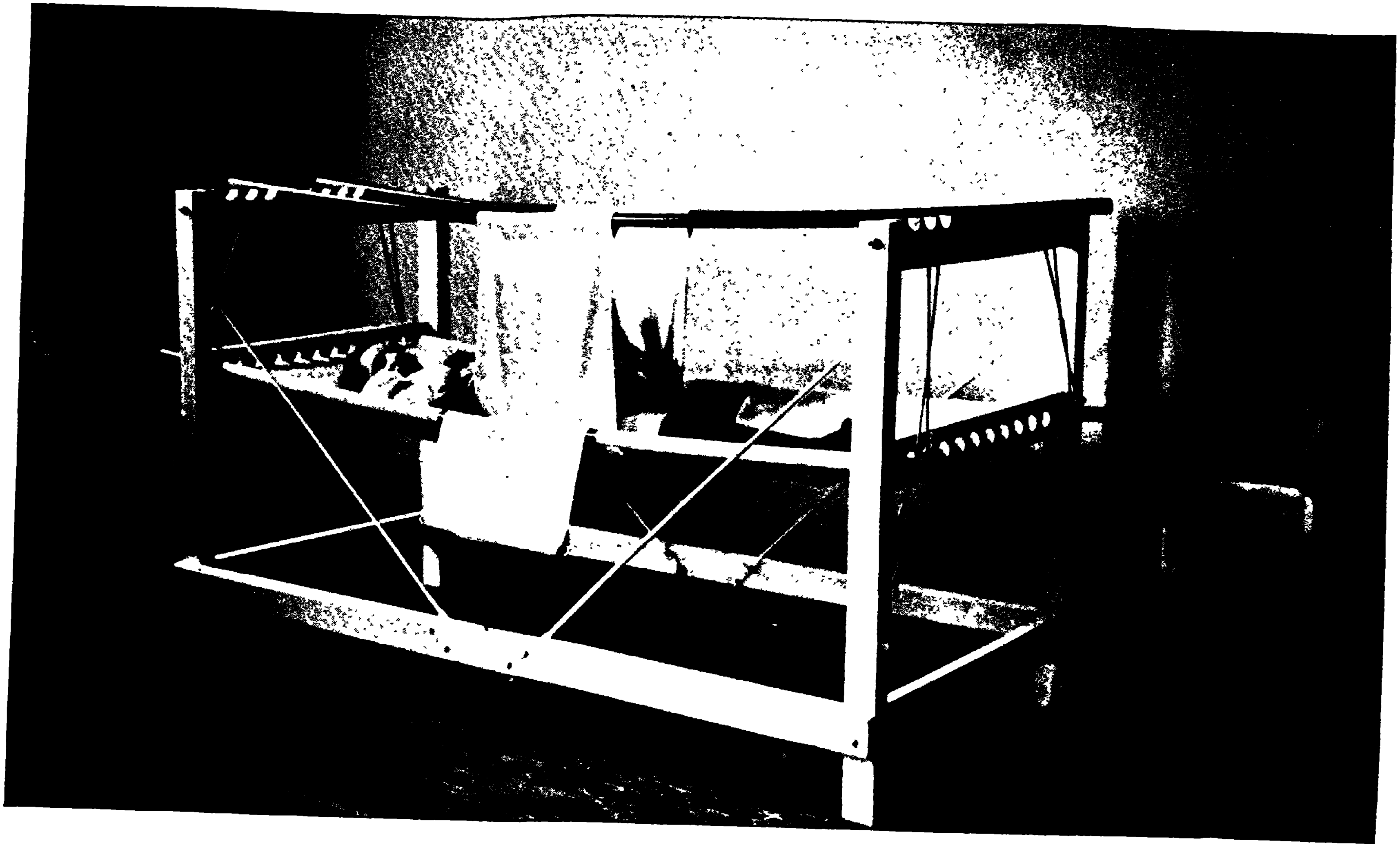


Fig. 80.—Ayers's method of performing symphysiotomy.

PLATE XLIX.



Ayers's Apparatus For Use After Symphysiotomy.

greater than that which normally exists in young primiparæ after a difficult non-instrumental labor. The fact seems to have been overlooked that in probably the majority of gravid women there exists motion at the symphysis for a variable interval. This motion, however, is not associated with disability, and before very long the fibrous tissue becomes organized and motion cannot be detected.

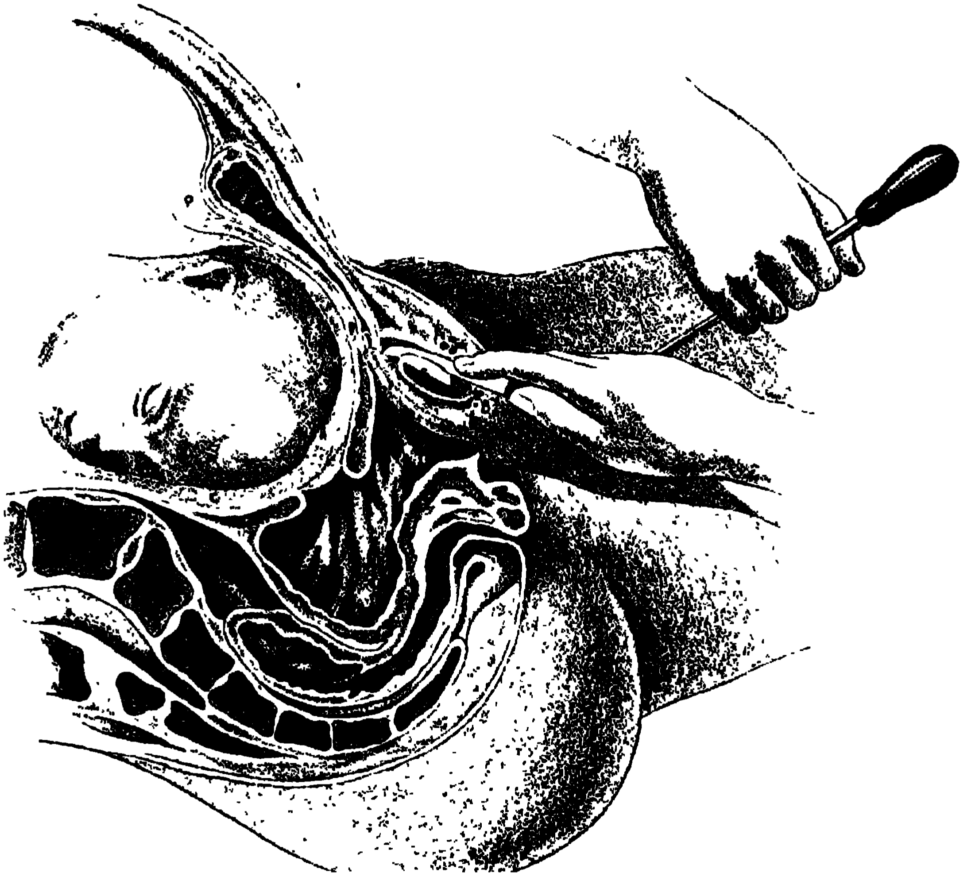


Fig. 81.—Showing relation of adjacent structures to symphysis. *A*, vessels of the clitoris; *S*, symphysis pubis; *B*, bulbi vestibuli; *C*, amnion; *D*, bladder—higher than usual; *P*, peritoneum; *H*, anterior lip of cervix.

Even if there should remain a degree of separation at the symphysis after symphysiotomy, we should not look upon this as an evil, for in the event of a future pregnancy a second operation might not be demanded should the woman be allowed to go to term.

Method of Operating Subcutaneously.—E. A. Ayers, of New York, prefers the subcutaneous operation, and has performed it a number of times. His directions are as follow:—

1. Secure full dilatation of the cervix, if possible without risk to the child.

2. Have the urethra and bladder held to one side with a sound.

3. Make the initial incision a little above the subpubic arch and under the *elevated* clitoris.

4. Introduce the left index finger within the vagina, against the posterior groove or ridge of the joint, up to the top.

5. Pass a narrow tenotomy-knife, with the point close to the joint, up to within a half-inch of the top, and *under* the overlying soft tissues.

6. Substitute a probe-pointed bistoury; meet the left index finger with the probe over the top of the joint, and work the blade through the joint downward until separation is felt by the posterior finger.

7. Have an assistant press the mouth of the wound and the tissues lying over the joint with a small piece of gauze.

8. Deliver with forceps, if possible, and refrain from suprapubic pressure, aiming to deliver the head through the cervix without drawing the latter down below the symphysis.

9. Hold the bladder well to one side while pressing the pubic bones together.

10. Pass a small strip of gauze into the prepubic wound, and another against the cervix, after irrigating, leaving both pieces exposed for easy removal, having refrained from stitching cervix or perineum.

11. Introduce a soft-rubber retention-catheter into the bladder and leave it until sure the patient can voluntarily micturate.

12. Dress the vulva with gauze and strap the joint with adhesive strips.

13. Remove all the gauze in thirty-six hours and irrigate vulva and vagina twice a day, keeping the vulva carefully dressed between-times.

Complications.—In the reported modern cases, the only ones which need concern us, the most unfortunate complication noted has been the formation of a fistula of the urinary tract, either vaginal or abdominal. The essential step for avoiding this we have already laid stress upon. If, notwithstanding, the accident should occur, often the lesion will heal spontaneously under cleanliness and catheterization. If spontaneous repair should not occur, then, some time after the puerperium, a secondary operation will be called for. It is a noteworthy fact that fistulæ have chiefly occurred in instances where the operation has been resorted to only after the fœtal presenting part had become wedged in the pelvic brim, and where the Galbiati knife had been used. We believe that when it becomes the practice to elect the operation before engagement, or, at any rate, before futile attempts at engagement have necessarily resulted in more or less pressure on the neck of the bladder, this complication will become excessively infrequent. Further, we question if the use of the Galbiati knife, in cases where the presenting part has engaged, is not responsible for many of the fistulæ. As we have already stated, when the presenting part has engaged there is scant room for the insertion of both the finger and the knife under the symphysis in the suprapubic operation. The insertion of the finger is absolutely necessary in order to insure the safety of the bladder; the Galbiati knife is not necessary for the performance of the operation. The majority of operations in this country have been performed without this knife, and we would, therefore, limit its utility to instances where the fœtal presenting part has not engaged, and where, therefore, there is ample room both for the finger and the knife.

Hæmorrhage as a complication of the operation need not be feared where the subcutaneous method is selected. At best this is only venous oozing, which is easily controlled by the gauze tampon. The open method of operating (along the anterior face of the symphysis), which we do not indorse, entails, of course, wounding of the venous plexuses of the vestibule, as also the vessels which nourish the clitoris. Hæmorrhage from this source may be very difficult to control, and the essential manipulations required carry extra chance of infecting the woman. The open method of operating, then, should be strictly reserved for instances where the deviation of the symphysis from the midline, or where the bony ankylosis forbids the performance of the operation by means of the knife, and calls for the chain-saw.

The further complication which is responsible for the loss of a fair percentage is septic infection,—a complication common to every surgical procedure, and an avoidable one.

When the operation was resuscitated it was feared that the ultimate result as regards locomotion would be bad. The record of the modern cases certifies, however, that this fear is unfounded. In many of the women there exists for a variable period a certain amount of motion at the joint, and in some cases the women complain of a sensation of motion there; but before long the fibrous tissue becomes organized, and these physical and rational symptoms disappear.

Ayers recently investigated this subject, and reports on 72 operations performed by 44 operators. Osseous union occurred in 5 cases; fibrous union in 10; close union in 16; firm union in 26; perfect union in 5. In 4 there existed separation to the extent of $^7/_8$ inch; in 1 less than $^1/_2$ inch; in 1 $^1/_4$ inch, and without exception the pubic joint was in a condition of satisfactory union. Grandin has recently seen 1 of his cases—nearly four years after operation—and there existed absolute immobility.

PROGNOSIS.

For the purpose of determining statistically the prognosis of this operation, we shall consider alone the data which have accrued during the past few years. Prior to this period careless asepsis was responsible for the mortality-rate.

The following data will enable us to judge the prognosis fairly: In general the mortality-rate has varied from 8 to 12 per cent. Individual operators in the United States have had a number of cases without death. Ayers, through his method, has operated six times successfully. Many of the fatal cases have died either from causes unassociated in any way with the operation or else the operation has not been an elective one; that is to say, it was postponed until the woman was in a state of extreme exhaustion—when any alternate operation would have resulted similarly, or else she was septic before operation.

It may be definitely stated that where the operation is one of election it need not have a mortality-rate. The sole risk the woman runs is from sepsis; and this risk is associated with every operation, whether major or minor. Here, again, the beneficent doctrine of election prevails in obstetric surgery.

However bright the prospects of the operation are for the future, it still remains true that for the present it will find its chief field in maternity hospitals. We feel that as yet a sufficient number of cases are not on record to warrant the physician in stating that there are no untoward results as regards locomotion. In private practice, therefore, it is essential, in order to guard against a possible suit for malpractice, to be very guarded in regard to the ultimate prognosis in this respect. Our own feeling in the matter is that the future will establish this operation on the firm ground of a scientific one, and when that day arrives there will exist no further warrant for the performance of embryotomy on the living in case of the lesser grades of pelvic deformity.

CHAPTER XVII.

CÆSAREAN SECTION.

If the fœtus is removed from the mother by means of an incision through the abdominal and uterine walls, the operation is known as Cæsarean section. The reader is referred to the numerous monographs which have been written on this subject for its history and the various modifications through which it has passed.

Perhaps of no other operation can it be said that the application of the rules of modern aseptic surgery has accomplished so much as in the one under consideration. It will require time yet, however, before the old prejudice among physicians and laity, engendered by reason of the unnecessary large mortality which accompanied this operation, can be eradicated. Statistics which embrace operations performed prior to ten years ago are of but little value, inasmuch as the technique of the operation has been so modified and perfected that results are entirely different.

The operation now is no longer postponed until the mother's vital forces have been spent in unsuccessful attempts, either on her part or on the part of the obstetrician, in delivering the fœtus *per vias naturales.*

Indications.—Cæsarean section may be performed either from absolute or relative indications. If the pelvic contraction is so marked that delivery of the fœtus by the natural passages be impossible, or if the pelvic canal be obstructed by solid, benign, or malignant growths, the operation is absolutely indicated.

Cæsarean section should be performed if the mother is moribund or has just died, if the child is still alive.

The relative indication has a much wider scope, and what is advocated here in this regard would not have been admissible a few years ago, when the mortality-rate was so high. However, in the light of recent cases, and when it is remembered how great a mortality exists as a result of embryotomy, and how repulsive it is to every physician to deliberately destroy life, it is certainly clear the Cæsarean section of the future will be done more frequently for relative indications and as an *elective* operation.

Given an instance of pelvic contraction in which the chances are against the delivery of a living child *per vias naturales*, and the time for induction of premature labor with resulting viable child having elapsed, the obstetrician is justified in performing the Cæsarean section, provided always the fœtal heart-sounds are clear and regular. The operation is not only done here for relative indications, but it is an elective one rather than as a last resort, as has too often been the case. The patient is carefully prepared for it previous to or at the beginning of labor, and, before she has had a chance to become in the least exhausted either by nature or by art, the abdomen is opened and the child delivered. When the operation is considered from this point, embryotomy of the living fœtus will become a lost art.

Operation.—Perhaps there is no operation the success of which depends so largely on the many and various little details as in Cæsarean section. The operator must have a personal observation of the preparation for the operation, if the best results are to be obtained. Formerly it was thought best to wait for the woman to go into labor before the operation was begun; but in those cases where it has been predetermined that the operation is necessary, it is far better to elect the time of its performance. The old idea that a certain amount of previous cervical dilatation was necessary no longer holds good, in the light of the fact that a few moments only are necessary to sufficiently dilate the cervix. The advantage which is to be gained by the deliberate preparation of the patient, to say nothing of being able to select the hour and light for the operation, more than compensates for the dilatation of the cervix which the normal labor-pains would induce. The statement that the uterus will contract more firmly if labor has already begun is purely theoretical, for, in point of fact, experience with just such cases has proven that the uterus does contract firmly as soon as it is emptied.

The operation is much more easily performed if a sufficient number of well-trained assistants are at hand. It is wise, however, that as few hands as possible be introduced into the peritoneal cavity, for, in this way, the possibilities of infection are lessened. There should be an assistant whose sole duty is to administer the anæsthetic; another to assist in lifting out the uterus; another to make compression around the cervix, and still another to assume the charge of the child. Two trained nurses will be necessary to wash the gauze pads and manage the irrigating apparatus. Very few instruments are necessary for this operation.

Two scalpels, one pair of laparotomy scissors, two dissecting forceps, twelve artery-clamps, four long compressive forceps, one groove-director, one needle-holder, six large and six small curved needles, and a steel dilator should complete the list. A perfectly-new fountain-syringe with a glass tube will answer every purpose as an irrigator. There should be in readiness eighteen sterilized towels.

In place of sponges, pads made of absorbent gauze, large and small, and sterilized, should be used. These should be counted before the operation and just before the abdominal cavity is closed. Five yards of sterile gauze, cut in strips three inches wide, should be at hand for intra-uterine tamponade if such prove necessary. A piece of rubber drainage-tubing, three-eighths of an inch in diameter and one yard long, should be boiled and held in readiness in case manual compression should fail to control hæmorrhage. Two sizes of silk (Nos. 4 and 2), silk-worm gut, and some fine catgut should be prepared.

All instruments and ligatures, except catgut, should be boiled immediately preceding the operation and placed in trays containing sterilized water. The operator, his assistants, and nurses must pay special attention to rendering their hands aseptic. Thorough scrubbing with soap and water, washing the hands in alcohol and then a five-minute immersion in 1 to 1000 solution of bichloride of mercury will accomplish this. The operator and his assistants should wear perfectly-clean operating-gowns, or, if these are not at hand, freshly-laundried sheets can be used in their stead. It is the duty of the operator to see that his assistants do not touch anything which has not been rendered aseptic after they have disinfected their hands, without repeating the scrubbing process before they assist in the operation.

Where the operation is one of election and there is time for thorough preparation, the patient should be prepared in the same way as if abdominal section for any other purpose was to be performed. A mild laxative for two or three days previous to the operation should be administered. On the evening previous to the operation the pubic region should be shaved and thoroughly washed. A compress which has been wrung from a solution composed of 1 part of the tincture of green soap and 3 parts of water is placed over the abdomen and held in place by means of an abdominal binder. The next morning the patient is given an enema of soap-suds and a vaginal douche of 1 to 3000 bichloride-of-mercury solution. The towel is removed and the entire surface of the abdomen is washed with 95-per-cent. alcohol and afterward with 1 to 1000 bichloride-of-mercury solution. A piece of damp bichloride gauze should be placed over the abdomen and confined by a few turns of a roller bandage; this the patient should wear to the operating-room. She should be catheterized immediately before the operation.

When the patient is brought to the operating-room she should be placed on a firm table, in the dorsal position with the knees slighly flexed. The upper and lower parts of the body should be covered over with pieces of new rubber cloth, and these in turn be covered with sterilized towels. The abdominal dressing is removed and the abdomen again washed with bichloride-of-mercury solution 1 to 1000. The operator, standing on the patient's right, makes the ordinary incision, extending through all the layers of the abdominal wall. This incision can now be safely enlarged, to a point about four inches above the umbilicus, with the scissors, using the fingers of the left hand to protect the intestines. Five or six heavy silk sutures should be passed through the upper three-fourths of the abdominal incision and left untied. The uterus should now be turned out of the abdominal cavity. This is easily accomplished if it is drawn toward the operator so that its left border is made to appear in the wound and then depressing the abdominal wall underneath it. The temporary silk sutures are now to be tightened, care being taken that no loop of intestine is caught within their grasp. The uterus is enveloped in warm sterilized towels and held by the assistant. Sterilized absorbent gauze is placed around the lower segment of the uterus and over the abdominal incision, so that no blood or other fluid may enter the abdominal cavity. A second assistant grasps the lower segment of the uterus with both hands lightly, prepared to control the hæmorrhage by manual pressure if such become necessary. It is preferred by some to control the uterine blood-supply by means of a rubber ligature passed around the lower segment of the uterus; but inasmuch as this nearly always causes serious injury to the peritoneum and does not control the hæmorrhage any better than can be done manually, it is not advisable.

The uterus is to be opened by making a 4 $^1/_2$-inch incision through the median line of its anterior surface, embracing the middle third of its length. The assistant who is grasping the lower segment of the uterus should compress it firmly at this time, to control the hæmorrhage from the uterine wall.

The incision should be made rapidly, and if the placenta is attached anteriorly it should be pushed to one side and the child extracted. As soon as the child is withdrawn, the assistant whose duty it is to take charge of it should clamp the cord with two compression forceps, cut the cord, and remove the child. The operator at once turns his attention to the placenta, and, if it is adherent, rapidly peels it off. All portions of placental tissue should be carefully removed. It is frequently a wise plan for the assistant whose duty it is to steady the uterus, as soon as the child is extracted, to grasp the edges of the incision between his thumb and fingers, and in this way assist in controlling the hæmorrhage from the cut uterine tissue. At this time an hypodermic injection of the fluid extract of ergot should be made into the gluteal region.

If the cervical canal will easily admit the finger, no dilatation is necessary; otherwise, the steel dilator should be introduced through the incision and the canal gently dilated. The uterus should be packed temporarily with gauze and the sutures introduced. The uterine incision should be carefully closed by means of two sets of sutures,—a deep one of No. 2 silk, which passes through all layers of the uterine tissue except the mucous lining, and the sero-serous suture of No. 4 silk.

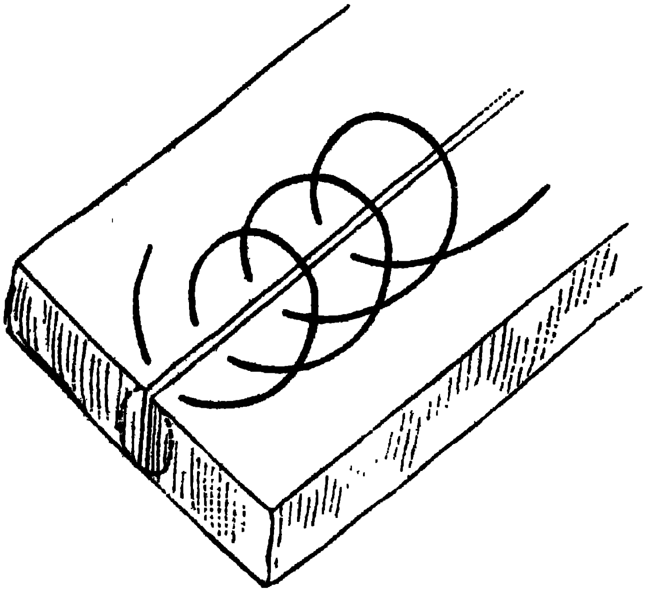


Fig. 82.—Showing deep suture passed, the loops not cut.

The deep sutures should enter the uterine tissue one-eighth of an inch from the line of the incision, and, passing diagonally outward into the uterine tissue, reappear just above the mucous lining of the uterus. The needle used for this suture should be a half-curved, perfectly-round needle, possessing no cutting edge. These sutures should be placed about one-half an inch apart. Time is such an important element in this operation that any device which can safely be used to expedite its performance should be adopted. By threading the needle with a piece of silk sixty inches long, and passing the sutures in the same way as if they were to be continuous, except that the loops be left four or five inches long and afterward cutting all the loops, the sutures can be more rapidly introduced than if each suture is on a separate needle. This is shown in Figs. 82 and 83.

As soon as all the deep sutures are in position, the temporary tamponade in the uterine cavity should be removed and the endometrium sponged out with a weak creolin solution. A strip of gauze, three inches wide and one yard long, is packed into the uterine cavity. One end of the gauze should be carried through the cervical canal into the vagina. This gauze not only provides for freer drainage, but is an additional safeguard against hæmorrhage. During the dilatation of the cervical canal and the passage of the gauze strip, the assistant who is controlling the hæmorrhage by pressure around the lower uterine segment relaxes his grasp. He should keep up this pressure, except at these times, until the deep sutures are tied.

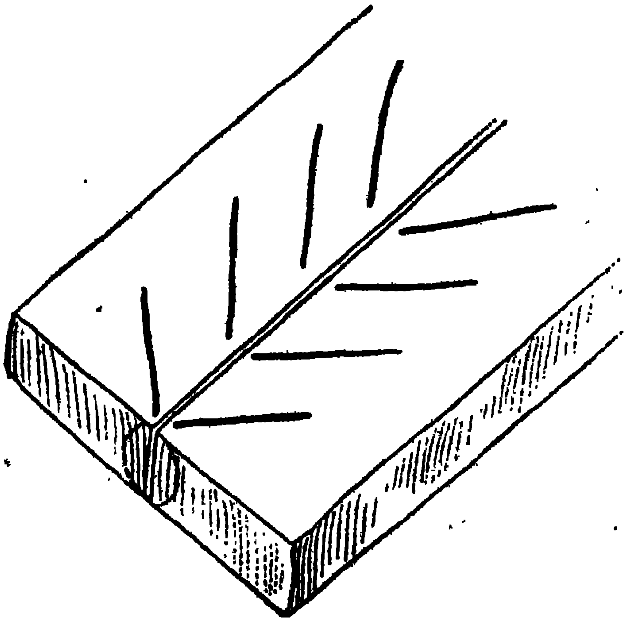
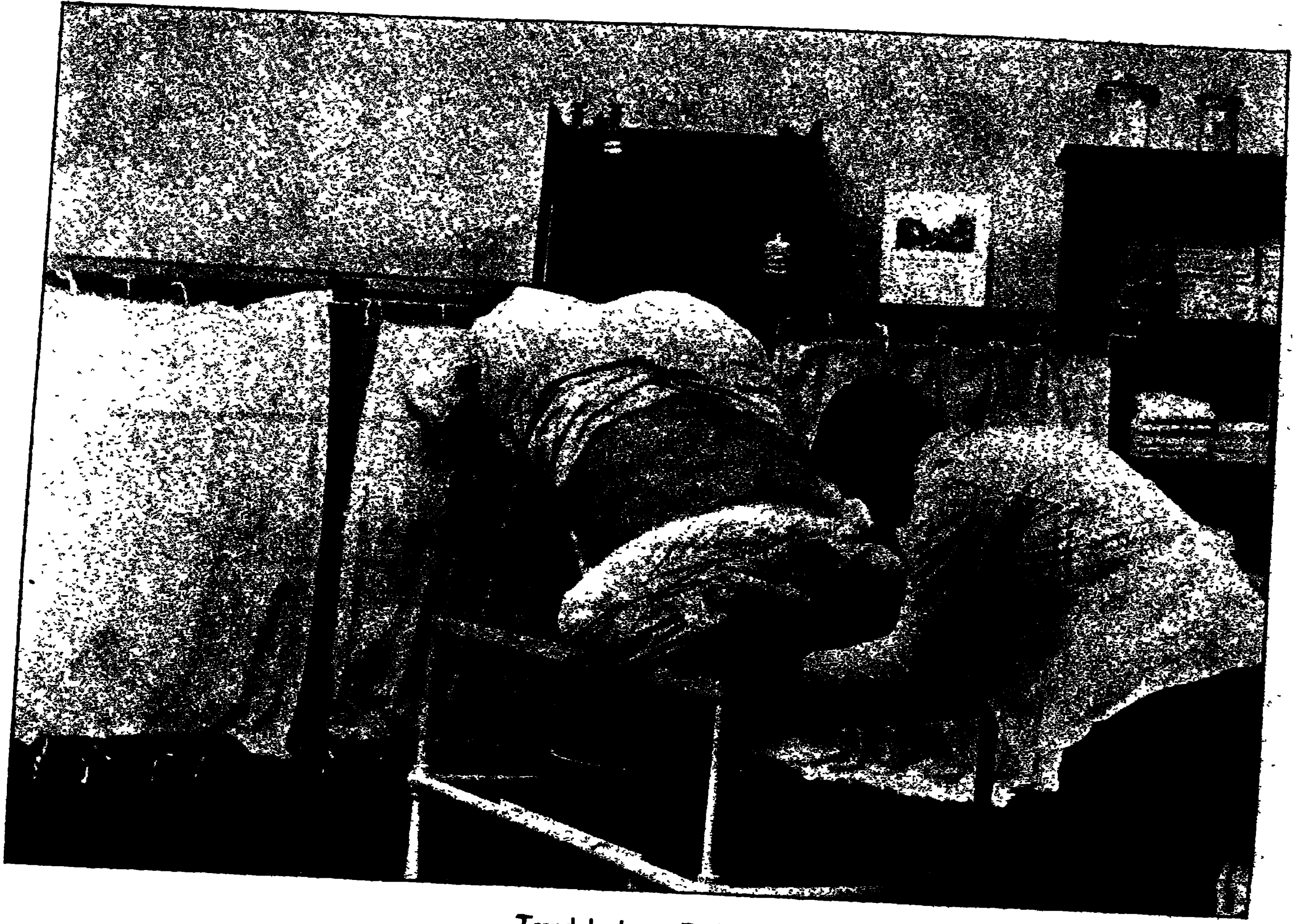


Fig. 83.—The same, the loops cut.

PLATE L.



Trendelenburg Position.

The sutures which embrace the muscular structure of the uterus are now secured by three knots, after which the ends are cut short.

The sero-serous sutures are of silk also, and interrupted. The Lembert stitch is the ideal one for bringing the peritoneal edges together. The number is almost double that of the deep sutures, one drawing the peritoneum directly over the knot of the deep suture and an intermediate one between each deep suture. The arrangement of both deep and sero-serous sutures is shown in Fig. 84.

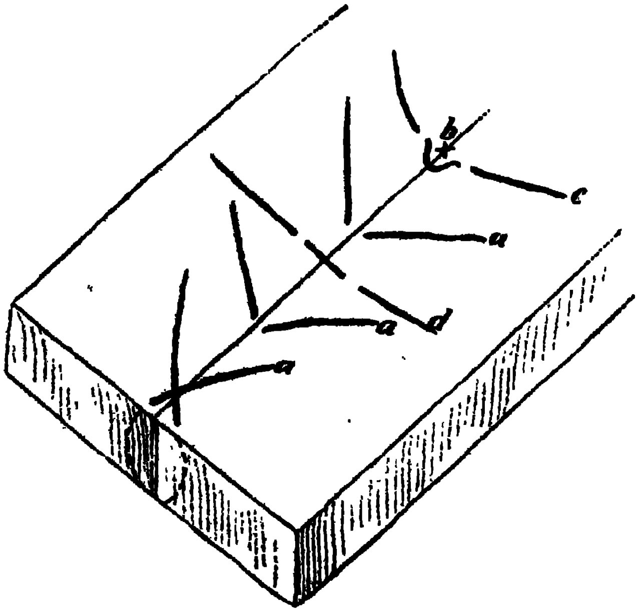


Fig. 84.—Suture of uterine wound. *a*, deep muscular suture; *b*, deep muscular suture tied, with the ends cut short; *c*. sero-serous suture passed over deep suture; *d*, sero-serous suture between the deep sutures, ready to be tied.

As soon as all the sutures have been secured the temporary abdominal sutures are removed and the peritoneal surface of the *cul-de-sac* of Douglas should be sponged out. If any liquor amnii has entered the peritoneal cavity it will be better to sponge it out with Thiersch's solution. When the cavity is sponged dry the abdominal sutures should be introduced. This cleansing of the cavity is best performed with the woman in the Trendelenburg posture. (Plate L.)

Silk-worm gut is, perhaps, the best material for this purpose. The abdominal walls are weakened to such an extent by reason of the pregnancy that unusual care must be taken to prevent the occurrence of ventral hernia. Before the suture is passed the assistant should draw the fascia well forward with a pair of mouse-toothed forceps. This suture passes through all layers of the abdominal wall, including the peritoneum. After these sutures are passed the fascia on either side of the incision should be united by means of silk-worm-gut sutures, secured by three knots, and the ends cut short. The deep sutures are now tied, and intermediate approximation sutures used if necessary.

An antiseptic dressing should be placed over the wound and secured by a closely-fitting abdominal binder. If at the conclusion of the operation the patient's pulse is weak and rapid, an enema of whisky and hot salt water should be given before she is removed from the table. The patient should be put to bed and external heat applied to the extremities. In case of collapse continuous irrigation of the bowel with hot normal salt solution should be resorted to.

Nothing should be given the patient by mouth during the first twelve hours following the operation except small quantities of hot water to relieve the thirst. If she suffer much pain, she may be given a small dose of morphine hypodermically. At the end of the first twelve hours, if she has ceased to experience nausea from the ether, small quantities of milk and lime-water can be given, which can gradually be increased according to circumstances.

An attempt should be made to move the patient's bowels as soon as any untoward symptoms, such as a rapid pulse, undue rise of temperature, vomiting, or abdominal distension develop. Otherwise the bowels need not be moved until the third day after the operation.

Calomel triturates, $^1/_2$ grain each, can be given for this purpose every hour for six doses. This should be followed by a simple enema and a saline by mouth.

The patient should receive nothing but liquid nourishment during the first week after the operation. The ordinary antiseptic pad should be placed over the vulva and renewed as necessary. The intra-uterine drain should be removed on the second or third day. Should the flow at any time be excessive, hypodermic injections of ergot should be used. Under no circumstances must the patient be allowed to assume the sitting posture during the first ten days.

The abdominal sutures, except those which unite the fascia, should be removed on the tenth day, and with the same care, as regards asepsis, as when they were introduced. The abdominal binder should be worn for one year after the section is performed. Unless some complication prolongs the convalescence, the patient should be up and around her room at the end of three weeks.

This is the method of conducting the elective operation, and, if the patient be in good general condition and the various little details of aseptic surgery are appreciated and executed, the patient should recover.

If, however, the operation is performed as a last resort, after perhaps thirty or more hours of labor, when the patient's vital forces are greatly lowered from her own and her physician's unsuccessful attempts at delivery, the outlook is by no means so encouraging. On the contrary, the mortality in just such cases is great, as is, in fact, any other operation which may be attempted.

LAPARO-HYSTERECTOMY.

Before the perfection of the method of performing Cæsarean section as it is done to-day, the mortality-rate was so high that an attempt was made to eliminate the uterine cavity as a possible source of infection, by removing the uterus after the child had been extracted. This was, without doubt, a great advantage over the old method of either not closing the uterine incision at all or else very imperfectly so.

The operation should not be performed at the present time not only on account of the greater and unnecessary mutilation, but also on account of the increased risk to the patient, unless there be some very well defined indication. If the Cæsarean section is performed on a uterus whose endometrium is already the site of sepsis, or if multiple interstitial fibroids complicate the case, or if such marked uterine inertia persist that loss of life from hæmorrhage seems imminent, then the entire removal of the uterus is indicated.

Operation.—Exactly the same preparations as have been suggested in Cæsarean section should be made in case total ablation of the uterus is to be performed, except that a greater number of long compression clamps and a large piece of thin rubber sheeting, such as is used by dentists, should be at hand. The details of the operation are the same as in Cæsarean section until the uterus has been turned out of the peritoneal cavity. At this time, instead of using manual compression, a piece of rubber tubing should be passed around the lower uterine segment and loosely tied with one knot. A small opening is now made in the rubber sheeting, which should be made to encircle the uterus just above the rubber tubing. The elasticity of the rubber sheeting will cause it to fit closely around the uterine tissue and prevent any fluid from the uterus entering the peritoneal cavity. With everything in readiness the assistant draws on the ends of the rubber tubing until the circulation is cut off. The operator at the same time hastily opens the uterus and extracts the child. The placenta is detached, and after double ligation of the ovarian arteries the uterus is amputated just above the rubber sheeting with the scalpel. If the endometrium has been the site of septic infection great care must be taken that no fluids enter the peritoneal cavity. The stump above the rubber tubing should be carefully disinfected and seared with the Paquelin cautery. If the patient is in poor condition from either sepsis or other causes, it is better to treat the stump extraperitoneally, inasmuch as this shortens the operation and lessens shock. If the stump is to be treated extraperitoneally for the reasons already given, the wire loop of the Koeberlè écraseur should be passed around the stump just below the rubber tubing. It is necessary to see that no portion of the bladder is caught within the grasp of the loop. This accident can be easily prevented if a sound is passed into the bladder to clearly define its attachment to the anterior wall of the cervix. The stump should be firmly compressed with the wire loop until the tissues are blanched. The stump should then be trimmed until it is three-fourths of an inch above the wire. The rubber tubing is removed as soon as the wire is tightened. The stump should again be cauterized and the two pins which accompany the écraseur passed through the stump, just above the wire, at right angles to the abdominal wound. The peritoneum should now be stitched with catgut around the stump. The *cul-de-sac* of Douglas should be carefully sponged out and the abdominal wall closed.

The operation is completed by powdering the stump with iodoform and applying the usual antiseptic dressings to the abdominal wound. The stump, which of necessity sloughs away, renders the convalescence tedious and the dressings frequent. The stump comes away in ten to twelve days and leaves a granulating surface. If the cervix is now dilated, and in this way we permit drainage from below, the wound will heal much more rapidly. A piece of gauze can be passed from above through the cervical canal into the vagina. If, however, the patient's general condition be good, and if the operation is determined upon from an elective stand-point, so that ample preparations can be made, and if the uterine body is the site of multiple fibroids, then the entire uterus together with the cervix, should be removed. In this case, as soon as the uterus is amputated and the field of operation disinfected, the assistant secures the rubber tubing by tying a double knot. The operator then proceeds to free the bladder from the anterior surface of the lower uterine segment. This can be easily and rapidly done by incising the peritoneum just above the bladder-fold and stripping the bladder-attachment off with the finger. The broad ligament should now be secured on either side by means of very strong silk ligatures. By palpation the uterine artery can be found and secured. The vaginal attachments to the cervix should be cut through and the stump removed. Any bleeding-points should be caught in the forceps and ligated. The ligatures should all be left long, and as soon as all hæmorrhage is controlled the ends should be passed into the vaginal opening. Sterile gauze should be packed in the supravaginal space, and the peritoneum closed by sewing the posterior peritoneal layer of the *cul-de-sac* to the peritoneal covering of the bladder with a continuous catgut ligature. In this way the raw surface is placed entirely extraperitoneally. The pelvis is carefully sponged and the abdominal wound closed. There is no necessity for drainage from above. The after-treatment should be the same as for Cæsarean section.

LAPARO-ELYTROTOMY.

The operation for removing the fœtus through an incision in the flank possessed advantages at the time when antisepsis and asepsis were unknown, inasmuch as it obviated the necessity of opening the peritoneal cavity. The improved Cæsarean section is so much easier of accomplishment, and is fraught with so much less danger, that the necessity for this method no longer exists.

PROGNOSIS OF THE CÆSAREAN SECTION.

There is no obstetric operation in which elective surgery plays a greater rôle in determining the prognosis than the one under consideration. Where the Cæsarean section is only determined upon after forceps and version have failed, the woman being exhausted and the child as well, the mortality-rate is necessarily high. The elective Cæsarean section, on the other hand, so simple and so accurate is its technique, subjects the woman to but one risk, and this is septic infection.

The Cæsarean section should alone be judged by its modern fruits. The mortality-rate in the past, ranging from 30 to 50 per cent., was due either to faulty technique or to sepsis. At the present, when the advantage of predetermining the operation is recognized, the death-rate, as is noted, barring septic infection, has been lowered approximately to that which is associated with difficult embryotomy.

Certain statistics collated by Robert P. Harris are the following: Of 13 cases where the operation was performed before labor had begun, 10 women recovered and 13 children were saved; of 6 cases where the operation was performed at the beginning of labor, 6 women recovered and 6 children were saved; of 12 cases where the women had been in labor from two to six hours, 10 recovered and 11 children were saved; of 18 cases where the women had been in labor from seven to twelve hours, 8 recovered and 13 children were saved.

These figures speak most eloquently in favor of the elective, predetermined, Cæsarean section. Two of the three deaths in the category where the operation was performed before labor had begun were due to septic infection, and the third succumbed to secondary hæmorrhage.

The record of individual operators in the United States and abroad surpasses the above statistical data, giving us, in general, a mortality-rate varying from *nil* to 10 per cent.

The result of asepsis and of election, then, has been to place the modern Cæsarean section on the same plane as other major surgical operations, with the addition of saving from 90 to 95 per cent. of infantile lives otherwise infallibly doomed.

As regards the Porro operation, the prognosis will probably always remain gloomier, owing to the extra complications which necessitate resort to it. The mortality-rate, however, has been in recent times lowered to about 15 per cent., and this percentage is lowered according to whether or not the operation is made one of *election*.

CHAPTER XVIII.

EMBRYOTOMY.

UNDER the term "embryotomy" are included a number of operative procedures which have received distinctive names, but the uniform aim of which is to deliver the fœtus *per vias naturales* after its mutilation to a greater or a less degree. In modern times the sphere of these operations has been greatly narrowed, owing to the perfection in technique and in results of induced labor and of Cæsarean section on the one hand, and owing to the resuscitation and elevation to a scientific plane of symphysiotomy on the other hand.

Embryotomy, generically considered, includes the following operative procedures: 1. Craniotomy. 2. Cephalotripsy. 3. Evisceration. 4. Decapitation.

In general the indications for these operations are: 1. Contracted pelvis, the fœtus being dead or non-viable and the conjugate diameter measuring above two and one-half inches. 2. Obstructed labor, due to monstrosity or to hydrocephalus. 3. Impacted shoulder presentation, impacted after-coming head, or irreducible face presentation, the fœtus being dead.

It will be noted that under these indications the proviso is made that the fœtus be dead, except when dealing with monstrosities. Our reason for such proviso is the belief, stringently insisted upon throughout this treatise, that, the maternal condition not contra-indicating in the manner sufficiently dwelt upon in the chapters on the Cæsarean section and symphysiotomy, recourse to these operations will usually be justifiable, and embryotomy of the live fœtus rarely be so. This, at any rate, has become the modern rule in maternity hospitals.

In private practice the question still remains open to the choice of the patient, and will so remain until the Cæsarean section becomes as safe an operation as, in the hands of an expert, embryotomy should be. In a given case, however, it is the bounden duty of the physician to set the relative stand-points of the two operations impartially before the woman. Neither sentimentality nor religious training or belief should swerve. To speak as definitely as possible, the woman's chances of recovery under embryotomy are fully nine out of ten, but then she loses her child; under the Cæsarean section the chances against her are two out of ten, whilst the child's chances of survival are nine out of ten. This fair estimate is, of course, based on the assumption that the Cæsarean section is an elective one, and, further,—a point to be well noted,—that the embryotomy of the living fœtus is not an elective one, for embryotomy under this condition will never become strictly elective. Where the Cæsarean section is not going to be taken into consideration, the average physician, outside of a hospital, will attempt every other possible procedure before deliberately electing an operation which entails the taking of life, even though it be to save life. This is an absolutely erroneous working basis. Where the cause of the pelvic dystocia is recognized, our science is well-nigh exact enough to enable the properly-trained physician to predicate the chance of delivery of the live fœtus of average size by means of the non-mutilating minor operations. Therefore, due election is as possible in the case of embryotomy as it is in case of any other obstetric operation. There is no credit in delivering the woman by embryotomy when she is so exhausted as to have but slight chance of surviving the operation. In major dystocia, then, embryotomy of the living fœtus should be elected in order to avoid a single percentage of mortality-rate; else the maternal chances from the Cæsarean section are far better than from non-elective embryotomy. That is to say, where the choice between the two operations is based on an absolute indication, the one or the other must be deliberately elected. It is the border-line cases which will always call for the soundest judgment, and here, fortunately, symphysiotomy can stand between the Cæsarean section and embryotomy of the living fœtus. As is amply emphasized under the subject of symphysiotomy, there is to-day left little ground for the choice of embryotomy. Under an absolute indication the Cæsarean section is as safe for the woman as the difficult embryotomy, and under the relative indication pubic section narrows very strictly the indications of embryotomy. In the near future, then, the physician in private practice, as he is now in hospital practice, may be relieved of the duty of killing the fœtus in cases where, through an alternate operation, both woman and fœtus may be saved.

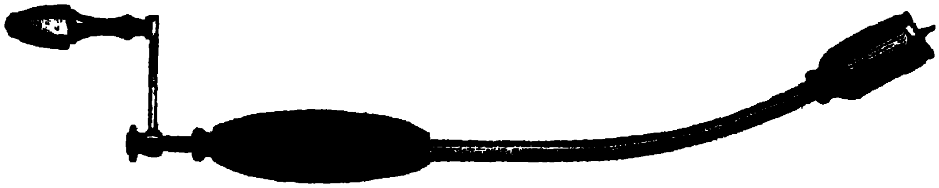


Fig. 85.—Braun's trephine.

1. *The Operation of Craniotomy.*—This operation, as the name implies, aims at diminishing the bulk of the fœtal skull. It is performed either on the before-coming or on the after-coming head. In the latter event it will rarely become a question of killing the fœtus, since the child will usually be dead before craniotomy is demanded. At best, craniotomy must be considered a difficult operation. The working room is slight owing to the contraction of the pelvis; for the same reason the cervix is rarely fully dilated: injury to the maternal parts is not an unlikely occurrence, and this traumatism increases greatly the risk from septic infection or, in any event, will complicate the convalescence.

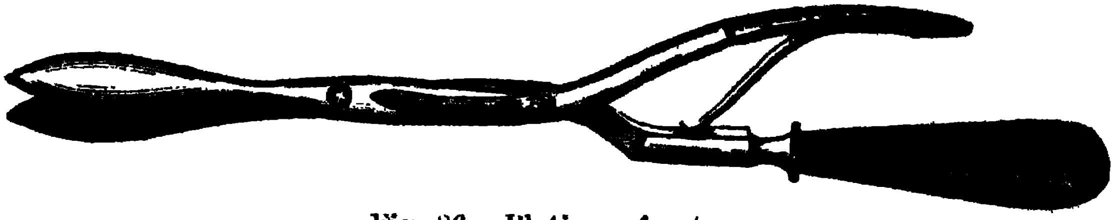


Fig. 86.—Blot's perforator.

The essential instruments requisite for the performance of craniotomy are: A trephine for perforation; a cranioclast for extraction. There are a number of types of perforators, such as

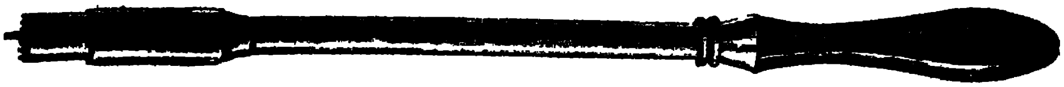


Fig. 87.—Martin's trephine.

Karl Braun's trephine, Blot's perforator, Martin's trephine, Naegele's scissors. Braun's and Blot's instruments are particularly useful in case the operation is performed on the before-coming head; the scissors answers best for the after-coming head.

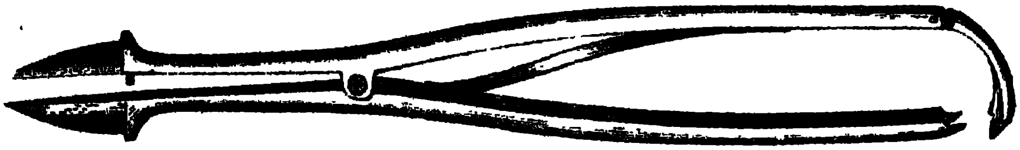


Fig. 88.—Scissors-perforator.

The head having been perforated, a sound (like the uterine or, better still, the metal urethral) is needed to break up the brain, and a syringe to wash out the contents of the cranium. This accomplished, the cranioclast or craniotractor—a better term, since it defines the purpose of the instrument—comes into play. The best instrument is that of Karl Braun.

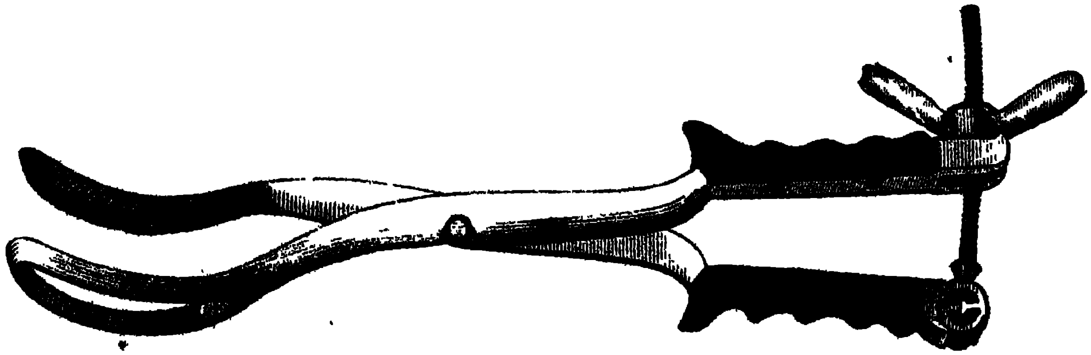


Fig. 89.—Braun's cranioclast.

The steps of the operation are the following: The external genitals and the vagina having been thoroughly asepticized, the woman is placed on a table, the bed not sufficing for any of the major obstetric operations. The instruments are sterilized and the hands of the operator and of his assistant are carefully cleansed. Too much care in this respect is not possible, since the sole risk in expert hands to which the woman is subjected is septic infection. If the woman be not excessively nervous, and the operative indication be not an extreme one, anæsthesia is not absolutely essential. In view, however, of its safety, we always counsel it.

The bladder having been emptied by catheter, the woman is placed in the lithotomy position and we proceed as follows:—

(*a*) *Craniotomy of the Before-coming Head.*—The fœtal head should be steadied at the brim through suprapubic pressure made by an assistant. The operator determines the position of the head through vaginal examination and selects the preferable point for perforation. Either a parietal or the occipital bone will be accessible, and one or the other should be chosen, sutures and fontanelles being avoided. The fingers of the left hand are placed against the fœtal head to steady the trephine and to guard against injury to the maternal parts. The trephine is pressed firmly against the head, its handle is steadied by the operator's right hand, and the nurse or the second assistant turns the screw of the trephine until the head has been entered. The trephine is now removed and the metal sound is inserted into the cranium to break up the brain. The nozzle of the syringe or a glass irrigating tube, fitted to the syringe, next takes the place of the sound and the brain is washed out. (Plate LI, Fig. 1.)

It has been contended that the preferable practice is now to leave the case to nature. We can see no advantage in this. The woman being anæsthetized, it is better to follow perforation with extraction. We thus avoid what may prove futile efforts on nature's part, and we thus forestall possible maternal exhaustion. The left or grooved blade of Braun's cranioclast is inserted into the opening made by the trephine; the other blade is applied to the outside of the skull, being guided into position by fingers of the right or left hand, according as the blade is applied to the left or the right side of the pelvis. The blades are locked; the screw is turned home, which results in firm hold of the head being secured. Traction is made, even as with the forceps, in the axis of the pelvic brim until the head reaches the pelvic floor, and then in the axis of the pelvic outlet. The fœtus having been extracted and the placenta having been expressed, an intra-uterine douche of 2-per-cent. creolin or of 1 to 8000 bichloride solution is given.

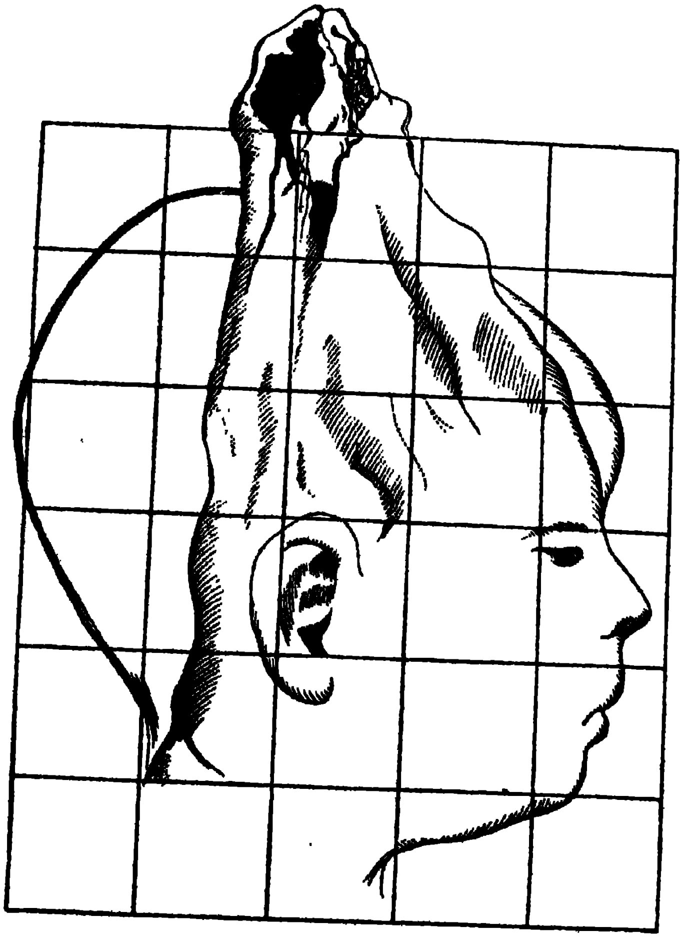


Fig. 90.—Effect of the cranioclast on the fœtal skull.

Where extraction by the cranioclast proves difficult owing to non-yielding of the occiput, the cephalotribe, as will be noted, should be substituted. It is to be remembered that extraction by the cranioclast is possible because, the cranial contents having been evacuated, traction on the head causes it to be compressed, and thereby diminished by the pressure exerted by the pelvic walls. Undue pressure is to be avoided in order to prevent, in turn, traumatism of the maternal parts.

(*b*) *Craniotomy of the After-coming Head.*—The operation on the after-coming head presents greater difficulties than that on the before-coming head. The trunk of the fœtus having been extracted, it is in the way of the necessary manipulations. Only exceptionally, also, will it be possible to elect the desirable point for perforation, this point being the occipito-atloid ligament. Further still, after perforation and excerebration, if the head be wedged tightly at the brim, the greatest possible care is requisite, in inserting the blades of the extractor, in order to avoid inflicting considerable traumatism on the maternal parts.

When possible to reach the occipito-atloid ligament, the scissors-perforator of Naegele is the best instrument. When the necessities of the case require perforation through the dense mastoid or occipital bone, the perforator of Martin or of Blot, being smaller than the trephine of Braun, should be selected.

The steps of the operation are as follow: After thorough asepsis of the genital tract and emptying of the bladder, one assistant steadies the head by suprapubic pressure, and a second pulls the trunk of the fœtus laterally, downward or upward, according as the operator has decided to perforate under the pubes, to one or the other side of the pelvis, or from below upward. If the occiput has been rotated under the pubes, as it ordinarily may, the operator determines with the finger the occipito-atloid articulation, and guides the scissors along this finger to the site. The finger must remain in position during perforation, in order to protect the bladder in the event of the scissors slipping. The wedge of the scissors having been entered at the articulation, pressure on the handles enlarges the opening into the cranium laterally, and next, by rotation of the scissors, similar pressure enlarges the opening antero-posteriorly. This having been effected, the scissors is removed and the metal sound is inserted for the purpose of breaking up the brain. The contents of the cranium are next washed out with sterilized

PLATE LI.

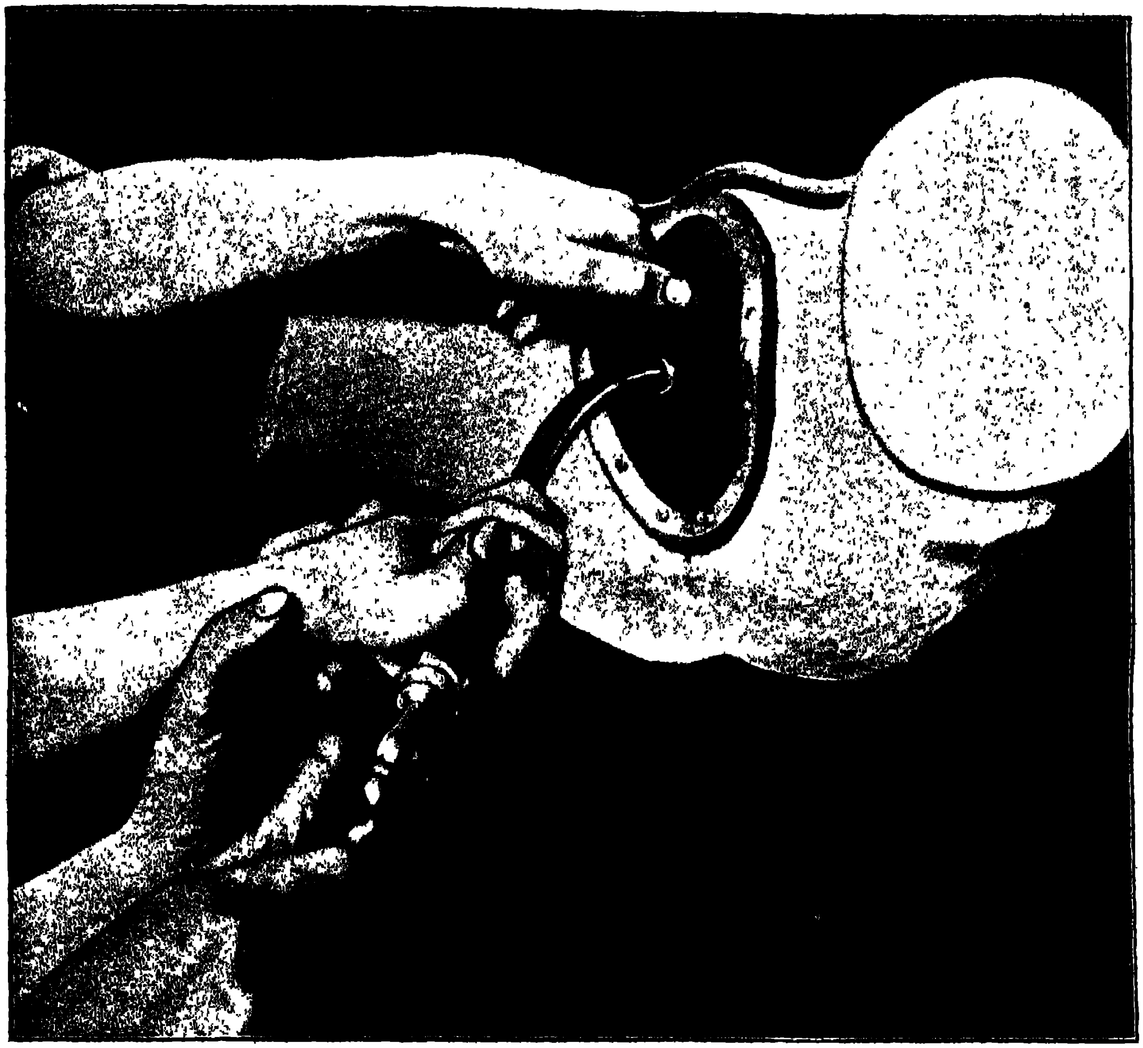


Fig. 1.—Trephining the Before-coming Head.

water thrown in by the syringe. If the pelvic contraction be not marked and uterine contractions are active, the excerebrated head may be born spontaneously. As a rule, however, extraction by the cranioclast is essential. The left, grooved blade of Braun's cranioclast is inserted into the cranial cavity, the right blade is applied laterally, the instrument is locked, and the screw is turned home. Traction is made in the axis of the pelvic inlet or outlet, according to whether the head is in the cavity or on the pelvic floor. (Plate LI, Fig. 2.)

If the position of the head is such that the occipito-atloid ligament cannot be reached, it becomes necessary to enter the skull through an opening made in one or another of the cranial bones, and then the scissors-perforator will not answer. Either Blot's or Martin's instrument is firmly applied to the point selected for perforation, and the skull is trephined. The other steps are similar to those just stated.

At times the fœtal head is extended at the outlet, so that practically we are dealing with an impacted face presentation. Under these circumstances the skull may be entered with the scissors-perforator through the roof of the mouth.

Exceptionally, owing to density of the cranium, it becomes impossible to extract with the cranioclast. Then, as will be noted, it becomes necessary to resort to cephalotripsy.

The operation of craniotomy having been completed and the placenta having been expressed, an intra-uterine douche of 2-per-cent. creolin or of 1 to 8000 bichloride solution should be administered. In the event of injury having been inflicted on the pelvic floor, the same should be repaired.

2. *The Operation of Cephalotripsy.*—The aim of this operation is to crush the skull in order to allow of readier extraction than is possible in certain instances by means of the cranioclast. The latter instrument is a tractor, pure and simple; the cephalotribe is at the outset a crusher and afterward a tractor. Perforation is as essential an initial step as in a case of craniotomy. The advantage, therefore, which the cephalotribe has over the crani-

oclast is that, being a more powerful instrument, it enables the operator to overcome the difficulties in the way of delivery by the simple tractor offered by a dense and fully-ossified cranium. The cephalotribe, however, has the disadvantage of being a bulkier instrument than the cranioclast, and, further, occupies more space in the pelvis, since neither of the blades is applied within the cranial cavity. For this reason, therefore, the cranioclast is to be preferred whenever the emergencies of the given case will allow of its application.

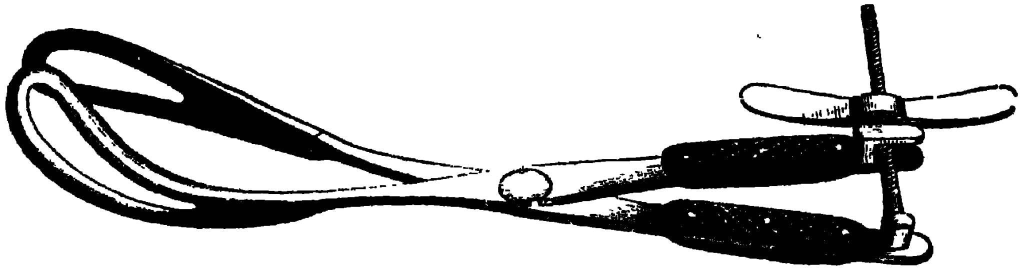


Fig. 91.—Lusk's cephalotribe.

Simpson, Hicks, Breisky, Lusk, and others have devised useful forms of the instrument. Lusk's cephalotribe, in most respects, will answer best where the instrument is indicated at all. Practically Tarnier's basiotribe will be found to take the place of either cranioclast or cephalotribe. The head is perforated by means of the

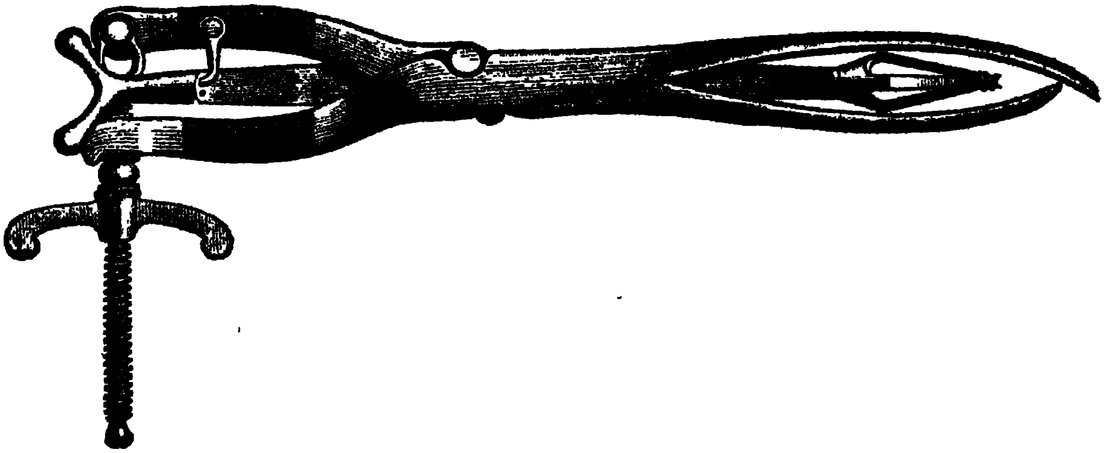


Fig. 92.—Tarnier's basiotribe.

central screw and the blades are then applied to the head and locked around the perforator. Obviously, since the cephalotribe is applied entirely between the walls of the pelvis and the fœtal head and since, further, the instrument, whilst diminishing the diameter of the head in one direction, increases it in another, it is applicable only when the operation is indicated in the presence of the minor grades of pelvic contraction.

Notwithstanding its advantages in certain cases, the cephalotribe is a more dangerous instrument than the cranioclast. Injury to the maternal parts is more likely, owing to the increased room in the pelvis its use entails; and, further, owing to the spicula of bone which are apt to project as the result of the crushing force applied. Still, the instrument is a most essential one in fortunately rare instances.

The initial steps of cephalotripsy are similar to those for craniotomy,—thorough asepsis of the genital tract, hands of operator and assistant and instruments, followed by perforation and excerebration. The blades of the cephalotribe are next applied accurately to the fœtal head, under the guidance of the fingers in the vagina. The screw is then turned home and the cranium is crushed, being elongated in the diameter opposed to that in which the crushing force is exerted. This latter point is ever to be borne in mind, so that during the process of extraction the enlarged diameter of the fœtal skull may be rotated, where choice exists, into the larger diameter of the pelvis. Extraction is made even as with the forceps, in the axis of the inlet, until the head reaches the pelvic floor, and then in the axis of the outlet. After delivery of the fœtus and the placenta, an intra-uterine douche of 2-per-cent. creolin or 1 to 8000 bichloride solution is to be administered, and any injury to the pelvic floor is to be repaired.

3 and 4. *Evisceration and Decapitation.*—These operations are applicable to instances where the fœtus lies transversely in the uterus, and impacted to such a degree as to forbid version, for the purpose of bringing the fœtal head in such relation to the pelvic brim as to permit of craniotomy.

Evisceration is called for where the neck of the fœtus cannot be reached, whereas, when it can be reached, decapitation finds its sphere of action. Both these operative procedures must be considered as well-nigh the most dangerous of all obstetric operations. Aside from the increased risk of direct traumatism to the uterus, in which organ, necessarily, the manipulations take place, the lower uterine segment is usually thinned, particularly in neglected cases, and, therefore, there exists considerable likelihood of rupture of the uterus.

Where the neck of the fœtus is not accessible and evisceration becomes the operation of necessity, the steps are as follow: After thorough asepsis of the genital tract, and similar precautions in regard to the hands of the operator, his assistants, and the requisite instruments, the scissors-perforator is guided along one or more fingers in the vagina to the most accessible portion of the fœtal trunk, is inserted to its full depth, and the opening thus made is enlarged by pressure on the handles. The metallic sound is next inserted into this opening, and the contained organs are broken up. This process is tedious and calls for extreme caution lest the sound perforate the fœtus, and thus inflict damage on the uterus. Whenever possible the finger of the operator should take the place of the sound. The cavity having been emptied of its contents, any projecting spiculæ of bone are removed by the bone-forceps, and then the fœtal trunk may possibly be bent on itself through traction applied by the blunt hook, and be thus delivered. Should this manipulation fail, the operator will be obliged to break the fœtus up further, dismembering it, and resorting to the cranioclast or to the cephalotribe for the extraction of the fœtal head. A number of

Fig. 93.—Bone-forceps.

complicated instruments, such as chain-saws, have been devised for use in these extreme instances; but they are one and all open to the objection that, being difficult to apply around the fœtal trunk, they are liable to inflict great damage on the maternal structures. A simple device is the following: When possible a sterilized gum-elastic catheter, threaded through its eye with a stout sterilized cord, is carried around the trunk of the fœtus. The catheter is unthreaded and removed, leaving the cord around the fœtus. The ends of this cord are brought out of the vagina through a cylindrical speculum, and then, by traction on the ends of the cord, the fœtal trunk may usually be sawn through. This failing, the sole alternative is to cut through the spinal column by the scissors. The name of *spondylotomy* has been applied to these procedures. Such an amount of traumatism is thus entailed that we question if, where the conjugate is diminished below two and three-fourths inches, it be not preferable to enlarge the pelvic diameters by symphysiotomy in order to obtain greater working space.

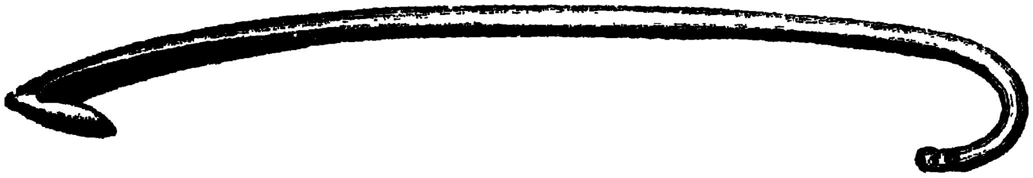


Fig. 94.—Crochet and blunt hook.

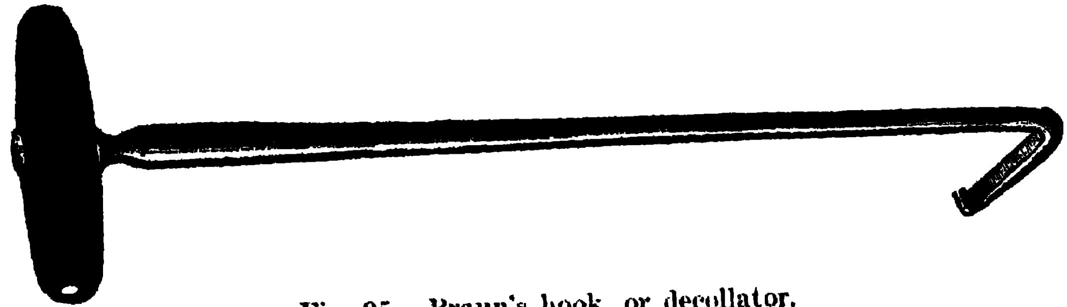


Fig. 95.—Braun's hook, or decollator.

Where the neck of the fœtus is accessible decapitation is the operation of choice. A number of instruments, complicated to a greater or less degree, have been devised for the performance of decapitation. The simplest of all is the Braun hook, or *decollator*. This hook can be used in every instance where the more complicated apparatus can; it is serviceable where the latter is not, for the reason that if there is not space enough to pass the decollator it is likewise impossible to adapt the chain-saw; it is readily rendered aseptic and is less likely to injure the maternal parts than any of the other devices.

In an emergency, where the Braun instrument is not at hand, a stout sterilized cord may be carried around the fœtal neck by means of a sterilized elastic catheter; the ends of the cord are carried through a cylindrical speculum out of the vagina, and a see-saw motion associated with traction will sever the head from the trunk. Whenever possible, however, the Braun hook is to be preferred, and the steps of the operation are as follow: The bladder is to be emptied. The genital tract, the hands of the operator and of his assistants having been carefully asepticized, the fœtal arm is brought down out of the vagina and handed to an assistant, who, through the exerted traction, steadies the fœtal neck at the brim and makes it more accessible. It is desirable to exert traction on this arm by means of a tape or a towel tied to it, otherwise the assistant will be in the way of the operator.

The aim of the operator is to pass the hook around the neck of the fœtus, and this is accomplished as follows: Inserting two fingers of the right or the left hand (according as the fœtal head occupies the left or the right half of the pelvis) into the vagina, the hook is passed flat along these fingers until the neck of the fœtus is reached. The point of the hook is then guided around the neck by these fingers from above downward, in order to lessen the risk of injuring the bladder. (Plate LII.) Firm traction is then made on the hook in order to assure a thorough hold on the neck, the fingers remaining in place so as to certify that the point of the hook is not injuring the maternal parts. The hook is rotated, traction being maintained until the neck is felt to yield through the breaking of the spinal column. As a rule, the soft parts also are thus severed, and the hook is removed along the fingers. If the

PLATE LII.

Insertion of Braun's Decollator.

hook has failed to sever completely the muscular attachments, the scissors, guided along the fingers, must be utilized.

The neck of the fœtus having been severed, traction on the prolapsed fœtal arm will ordinarily serve to deliver the trunk, the fœtal head slipping upward. The next step is to remove the head.

If the indication for decapitation has been an impacted transverse position of the dead fœtus, in a pelvis where there exists no special disproportion between the pelvis and the fœtus, the forceps will answer for extraction. The head being steadied at the pelvic brim by an assistant, the forceps is applied in the usual manner, and delivery is effected under the rules applicable to the forceps operation.

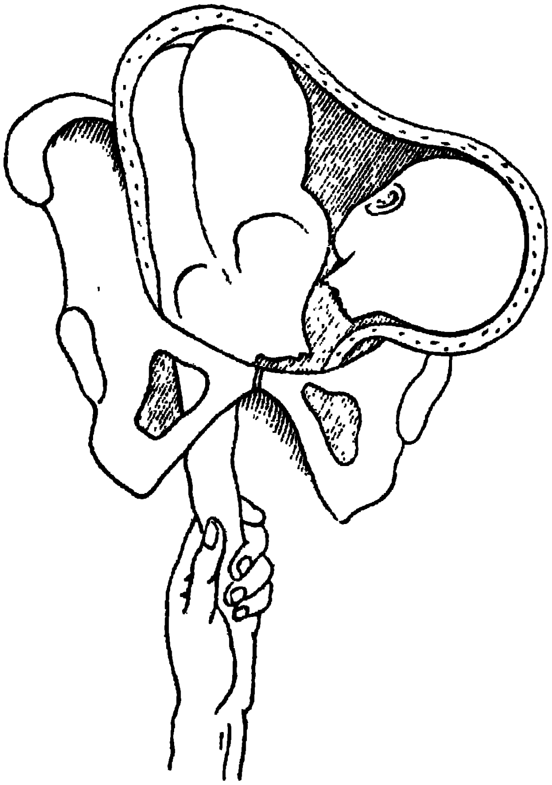


Fig. 96.—Delivery of trunk after section of head.

Where, however, there exists dystocia due to contracted pelvis or to large fœtus, the manipulations become more difficult according to the degree of dystocia. The method of inserting the blunt hook into the cranium through the foramen magnum and delivering by traction has been advocated, but should be rejected owing to the risk of the hook's slipping and injuring the maternal parts. The preferable method is the following: If the head can be fixed at the brim with the foramen magnum presenting toward the vagina, then excerebration by the metal sound and extraction by the cranioclast or the cephalotribe is advisable. If the head cannot be so fixed, then perforation by the trephine or the scissors-perforator is demanded, followed by extraction by the cranioclast or the cephalotribe. The risk to the maternal parts is here great, owing to the fact that the point of impact of the trephine or scissors can rarely be at a right angle, and there is, therefore, great danger of the instrument's slipping. If the pelvis be large enough to permit of its introduction, Tarnier's basiotribe will answer admirably.

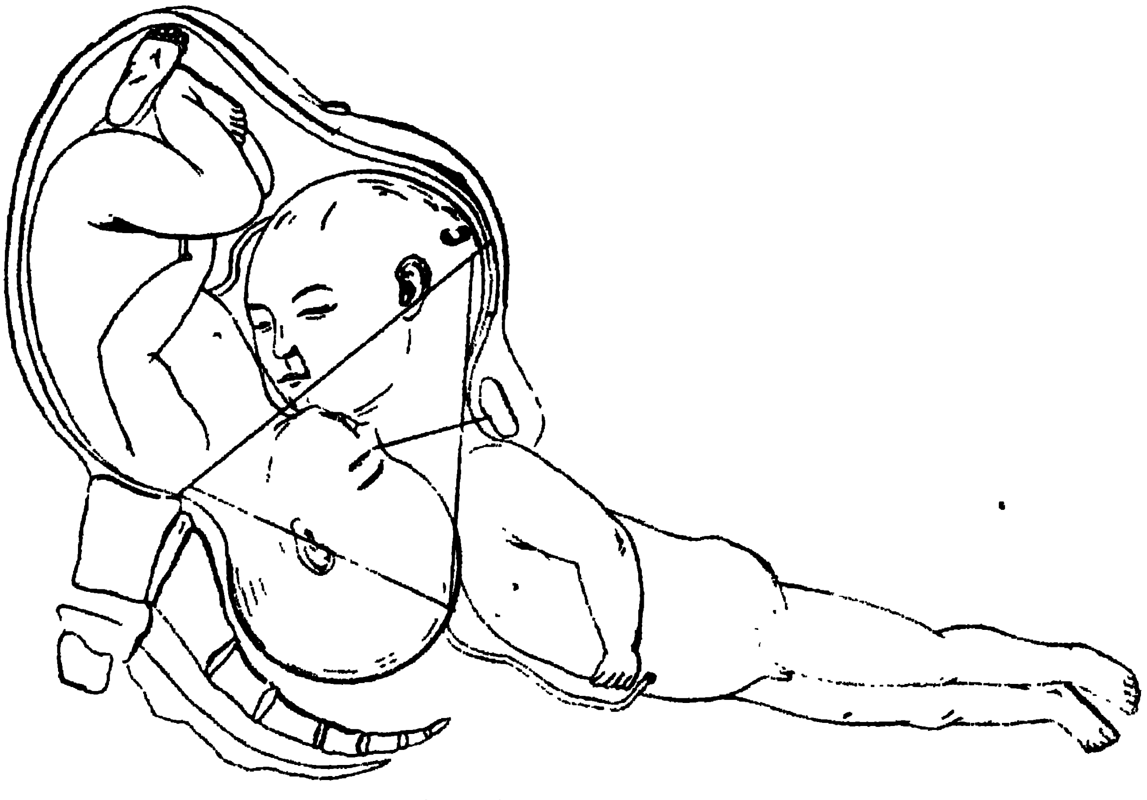


Fig. 97. –Locked twins.

The uterus having been emptied, a 2-per-cent. creolin or a 1 to 8000 bichloride douche should be administered, and lesion of the genital tract be repaired as completely as is possible.

Aside from impacted transverse presentation, decapitation may be called for in case of locked twins.

The trunk of one fœtus having been born, and it being found impossible by manual and postural treatment to decompose the wedge formed by the fœtal heads, the only possible resource is the sacrificing of the first fœtus—in case it be not already dead—in order to give the second fœtus a chance of life; for it is the first fœtus, the trunk of which is born, whose life is most endangered. The steps of the operation do not differ from those just stated.

PROGNOSIS OF EMBRYOTOMY.

It is not possible to state specifically the death-rate from embryotomy. The statistical data at disposal are useless, because of the fact that many of the records include operations performed before the stringency of asepsis was recognized, and, further, because the operation, except under absolute indication, has rarely been one of election. It is a significant fact that the mortality following embryotomy is higher in private than in hospital practice. The reason is that in the former practice the temptation is to test the method of delivery by forceps and version before resorting to embryotomy; often because accurate mensuration of the pelvis having been neglected, the practitioner is unaware of the cause of the dystocia till his eyes are opened by the fact that the methods of delivery with which he is most familiar are of no avail. Embryotomy is then resorted to on an exhausted woman with genital tract already damaged, to a greater or less degree, by the futile efforts at delivery by methods which the mechanical problem forbid. Deliberate election of embryotomy, on the other hand, is more likely to be the rule in hospitals, and, therefore, the mortality is lower. Further still, the mortality depends on the indication for the operation selected. Where the dystocia is not extreme and the operation, therefore, not a difficult one, the sole risk entailed by embryotomy is sepsis. In the higher degrees of dystocia, particularly where evisceration is called for, the mortality must always remain relatively high owing to the lesions which, even in the hands of the most expert, the maternal parts are likely to incur.

Minor lesions, such as lacerations of the cervix or of the pelvic floor, if repaired at once and aseptically, are not likely to enter as complications of the puerperal state. Neither are fistulæ, if the result of direct traumatism and not of sloughing following prolonged pressure. The major risk the woman runs is rupture of the uterus,—a not unlikely accident where embryotomy is demanded in a justo-minor pelvis of high grade through an undilated cervix. Whilst, indeed, embryotomy may prove a very simple operation, it may also become the most difficult of all the obstetric operations. For this reason, when the child is alive, it has become the custom in hospitals to weigh carefully the chances in the boundary-line cases of Cæsarean section and of embryotomy. It becomes a question not, as is often erroneously argued, of the greater value of one life over another; it becomes a question of the deliberate, scientific election of that operation which subjects the woman to the least risk. There is no doubt but that difficult embryotomy, in the hands of the non-expert, subjects the woman to greater risk than does the Cæsarean section, provided always that he is familiar with the simple technique of the latter operation, as he should be, if competent to attend the lying-in woman at all.

CHAPTER XIX.

THE SURGERY OF THE PUERPERIUM.

THE puerperal state begins with the expulsion of the placenta, which event terminates the third stage of labor. In case surgical interference has been required during the course of labor, the genital tract has likely enough suffered certain lesions which it becomes the duty of the physician to repair. As a rule, the surgery requisite may be denominated minor, with the exception of one complication,—rupture of the uterus.

In the event of labor or the surgical interference not having been conducted aseptically, there will develop, during the course of the puerperal state, a number of complications, which may also require surgical intervention, and, as a rule, this surgery is of a major nature.

The operations, then, which we are called upon to consider depend either on traumatism, avoidable or unavoidable, or on sepsis, which, from the modern stand-point, must be looked upon as almost always avoidable.

The operations resulting from traumatism are the following: 1. Laceration of the cervix. 2. Laceration of the pelvic floor. 3. Fistulæ. 4. Rupture of the uterus.

The affections depending on septic infection which may demand surgical interference are: 1. Endometritis and metritis. 2. Pelvic abscess. 3. Peritonitis. 4. Mastitis.

IMMEDIATE REPAIR OF THE LACERATED CERVIX.

It is only of late years that it has been considered desirable to attempt the immediate repair of the lacerated cervix. The objections to the operation have been the problematical result as regards primary union and, further, the belief that it was impossible to resort to the operation without the presence of a number of assistants. There are now a sufficient number of cases recorded to warrant the assertion that primary union may usually be expected, and if the technique we proceed to describe be followed skilled assistants are not necessary. On the other hand, the primary operation shuts off one of the avenues of sepsis, and removes at once one of the most frequent causes of subinvolution, as well as, in case of union, relieves the patient of the necessity of the secondary operation.

The immediate operation is either one of election or one of strict necessity. It becomes one of necessity when, either after spontaneous labor or after operative interference, profuse hæmorrhage occurs and continues, which, on investigation, is found to be due to a cervical tear involving a circular artery. Here the only other resource is tamponing the vagina, which is unscientific as well as often nugatory. The operation becomes one of election in the lesser degrees of laceration. Unquestionably many such lacerations heal spontaneously, probably the vast majority if the course of the puerperium is aseptic. Still, we question if, where the laceration exceeds what may be termed the first degree, the patient has not the right to expect her physician to leave her in the best possible condition, in order to save her from the grasp of the gynæcologist later.

In case the operation is called for on account of laceration involving the circular artery, there exists no contra-indication. The immediate safety of the woman demands it. There are contra-indications to the performance of the operation in the presence of the lesser grades of laceration. If the woman is exhausted from prolonged labor, or if, owing to post-partum hæmorrhage, it has become necessary to use the uterine tamponade, then resort to the operation is either inadvisable or impracticable.

The instruments requisite for the performance of the operation are the following: A strong vulsellum forceps, a needle-holder, and a few large curved needles, preferably the Hagedorn. The preferable suture material is silk-worm gut. Catgut is unreliable, since it is apt to dissolve too soon and, furthermore, because the knot is apt to slip. The silk-worm gut is readily sterilized by boiling for a few minutes, and may be left *in situ* for weeks, as may be requisite, if, at the same time, it is necessary to repair the pelvic floor. A speculum is not strictly requisite, since, according to the technique about to be described, the operation is performed without one. The main advantage in dispensing with a speculum is that thus an assistant to hold it is not required. If the operator happen to have an Edebohls speculum with him, however, the counter-weight may be obtained by means of a flat-iron, which is to be found in every household.

The steps of the operation are the following: The woman is brought to the edge of the bed; the bladder is emptied; anæsthesia is only requisite in case the woman is excessively nervous. If the requisite assistants—two in number—are present, each may support a leg; but, in the event of these assistants not being present, the physician may use a sheet as a leg-holder by passing it around the knees and tying it to the patient's arms. The requisite instruments, having been sterilized by boiling, are placed handy to the operator's right hand, a lighted candle or lamp, in case the gaslight is not sufficient, being held by the nurse or by some relative so as to illuminate the field of operation thoroughly.

The operator seizes the cervical lips firmly with the double tenaculum, and pulls the uterus downward until the cervix is at the ostium vaginæ. The object of this traction is twofold: In the first place, the laceration is thus made accessible for operation, being performed under the guidance of the eye, and, in the second place, when the uterus is thus pulled downward, it is a well-known fact that hæmorrhage from the organ is, in a measure, checked. For this reason the technique described is preferable to that which entails operating through the Sims speculum, when the hæmorrhagic flow which always exists after the completion of labor renders the operation difficult by interfering with the field of vision. The next step is to pass the first and the most difficult of the stitches, which, once in place, gives the operator full control. A Hagedorn needle threaded with silk-worm gut is passed deeply, at the angle through the posterior cervical lip, under the lacerated surface, emerging in the canal. It is reinserted into the anterior lip at the canal, and emerges at the angle of the tear in the anterior lip. The remaining stitches are inserted in a similar manner, first on the one side, and next on the other, until the raw surfaces of each lip have been approximated. The sutures are next tied. It is important to remember that it is essential to tie the stitches tighter after the primary operation than after the secondary, when the aim is simply to bring the denuded surfaces in apposition. After delivery, the cervix is always œdematous to a greater or less degree, and, if the stitches be not tied tightly then, in the course of a few days, when the œdema disappears, the stitches will necessarily be slack and deep union by first intention is unlikely. It is to the neglect of this precaution, we believe, that failure after the primary operation may often be traced.

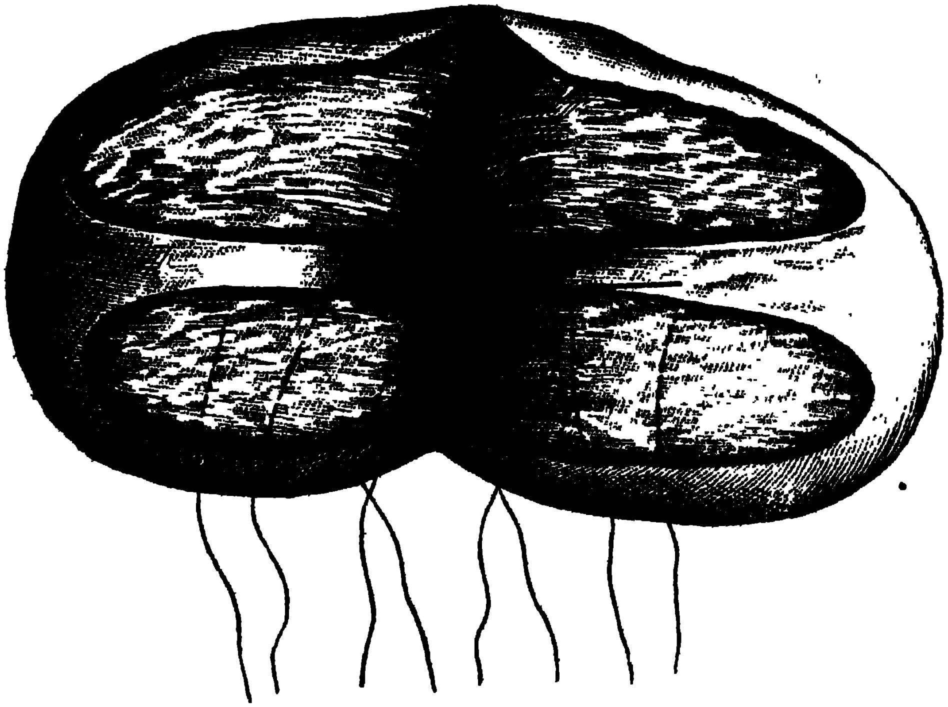


Fig. 98.—Sutures inserted on one side of a lacerated cervix.

The sutures having been tied, the vulsellum forceps is removed and a hot 2-per-cent. creolin douche is administered. The average time requisite for this operation is ten minutes. In case of failure in obtaining union, the woman's condition is none the worse for the attempt made to leave her in the best possible state, whilst, if union do occur, the woman is spared many of the ills which a lacerated cervix sooner or later entails. There is a further phase of this question which it is well to dwell upon. If the immediate operation be not performed in case of deep cervical laceration, dense cicatricial tissue inevitably forms; so that when the secondary operation is called for there is not alone much more difficulty in performance, but, in the opinion of many, it may even become, not a question of mere repair of a laceration, but one of amputation,—a more radical operation. We believe that before long it will be recognized as desirable to perform immediate trachelorrhaphy, as it is to-day considered a sign of incompetency if repair of the pelvic floor is not attended to immediately, in the absence of contra-indication.

The stitches in the cervix may be left *in situ* from ten days to a number of weeks, according to the necessities of the case. The longer interval is requisite where it has also been necessary to operate on the pelvic floor. If the stitches are aseptic, as they should be, when introduced, they can give rise to no possible trouble during the puerperal state. The assumption that they may interfere with drainage of the lochia is untenable, since the operation simply restores the cervix to the shape it has where laceration has not occurred. It goes without saying that we presuppose that requisite care has been taken not to sew up the cervical canal.

IMMEDIATE PERINEORRHAPHY.

The conscientious physician aims to leave his patient, after confinement, with the pelvic floor in as sound a condition as art can make it, in the event of its having been lacerated during the process of delivery. There is little need at the present day to dwell on the untoward sequelæ which inevitably follow in the train of unrepaired lesion of the pelvic floor. The laity, as well as physicians in general, recognize the necessity of the primary operation,—

so much so, indeed, that the former consider their medical attendant blameworthy who has failed to recognize a lesion, and thus neglected to repair it. The student need not have the fear that, if the lesion occur, it will be laid to his lack of skill. The practitioner who claims that, in an extensive practice, he has never seen a lacerated perineum has become to-day a *rara avis* in the light of the recorded experience from hospitals which certify to the necessarily frequent occurrence of lesion even in the hands of the most expert. The proper spirit to-day is to fear the blame which deservedly attaches itself to the attendant who neglects the performance of the primary operation whenever the conditions contra-indicating are absent.

The routine practice, after the completion of the third stage of labor, should be to investigate by sight, as well as by touch, the pelvic floor. There may be no apparent lesion externally, and yet, on separation of the labia, the most dangerous of all lesions, as regards its after-consequences, will be detected. It is now firmly established that the mere external tears are of no consequence beyond opening an avenue for the entrance of germs. It is the tears which involve the muscles and fascia of the pelvic floor which entail ultimately rectocele and cystocele, with their sequelæ. Too much stress, therefore, cannot be laid on the necessity of separating the labia and examining the pelvic floor.

The sole contra-indication to the immediate operation is exhaustion of the woman to such a degree, from prolonged labor or from post-partum hæmorrhage, as to call for absolute and immediate rest on her part. Of course, where, owing to post-partum hæmorrhage, it has been necessary to resort to the gauze tamponade of the genital tract, the operation cannot be performed. Where the lesion, at best, requires but a few stitches, anæsthesia is not requisite, since the sensibility of the pelvic floor has been largely diminished from pressure associated with delivery. But, if the tear be one of a major degree, anæsthesia is desirable in order to enable the attendant to perform the operation with the requisite care as well as in order to save the woman unnecessary pain.

The instruments requisite are the following: A pair of scissors, a needle-holder, a few curved needles (preferably the Hagedorn). Material for suture will differ according to individual preference, but the silk-worm gut possesses all the advantages of silver wire or catgut, and has none of the disadvantages of the latter. Where the tear is chiefly internal, catgut, if its asepticism can be depended upon, answers admirably, since it is possible to use it as a running suture; but even then it may dissolve before deep union is secured, or, notwithstanding the precautions taken, it may prove the source of local sepsis. As for silver wire, it possesses no advantage for the primary operation over silk-worm gut, and requires infinitely more time for adjustment as well as more instruments. Silk-worm gut is readily sterilized by boiling, and, if aseptic, it may be left *in situ* for an indefinite time.

The method of operating will be modified according to the character of the laceration. The average text-book confuses the reader by the description of one or another operation as being the preferable. *The suturing must be adapted to the tear.* The most complex operation, of course, is demanded where the laceration extends through the sphincter ani, to a greater or a less extent, up the rectal wall. In the lesser grades the suturing usually will be almost entirely within the vagina. Before proceeding to operate the physician should make a careful examination in order to determine the manner after which the pelvic floor has been injured, in order to secure deep union and proper approximation of the fascia and muscles. The ancient method of simply passing the sutures in at one side and out at the other will not stand the critical test of modern methods, for the day has gone by when securing a skin perineum is deemed sufficient. The parts operated upon must not alone look well, but must also subserve their intended purpose well.

Where the laceration has not extended through the sphincter of the anus the steps of the operation are as follow: The woman is brought to the edge of the bed, the legs are flexed on the abdomen and are held there by the nurse, or, if she is needed for other purposes, a sheet may be passed under the knees and each end tied to the patient's arms. As a rule, except in the minor degrees of laceration, anæsthesia is requisite. In order to avoid sponging, the field of operation may be irrigated to advantage by a weak solution of bichloride. Creolin is objectionable for irrigating purposes, since, owing to its color, it interferes with a good view of the field of operation. An assistant or the nurse, with aseptic hands, separates the labia so that the operator may determine the extent of the laceration. With the scissors jagged ends of tissue are cut off, thus securing an even surface for union. If the laceration has extended chiefly into one sulcus, as is not infrequently the case in the lesser degrees of lesion, a running catgut suture may be used to advantage. The needle is inserted at the apex of the tear, deeply, so as to secure as much of the divided fascia as possible, and the gut is tied. The over-and-over stitch is now rapidly taken, the needle on each occasion it is inserted being made to enter deeply, until the external end of the laceration has been reached, when it is tied. Occasionally the tear involves both sulci, in which event the process is repeated on the other side. In order to see well, the upper vagina is tamponed with sterilized gauze, which prevents the trickling of the uterine discharges.

In general, however, Hegar's method of operating (modified to suit the case) will give the most satisfactory result, even though its performance takes more time than that which we have just described.

The method is peculiarly applicable to the vast majority of lacerations, since these begin in the median line and extend laterally. The suturing is almost entirely internal, and approximates accurately the divided ends of the muscles and fascia, the aim which is essential in order to properly repair the lesion.

The needle is inserted at the margin of the tear near its apex, and passed deeply around to the opposite side. Similar sutures are inserted at an interval of about a quarter of an inch apart, till the tear has been approximated down to the carunculæ myrtiformes. The sutures are then tied and cut short. The superficial tear remaining is brought together by two or more sutures

Silk-worm gut answers admirably, and, if need be, a few interrupted sutures of catgut may be inserted. These sutures, if aseptic, may remain in place for a week or ten days. If there exist much œdema of the pelvic floor, the result of protracted labor, the precaution must be taken to tie the sutures a trifle tighter than is the rule for plastic work; otherwise, on the disappearance of the œdema, the sutures will be relaxed and deep union will not be secured.

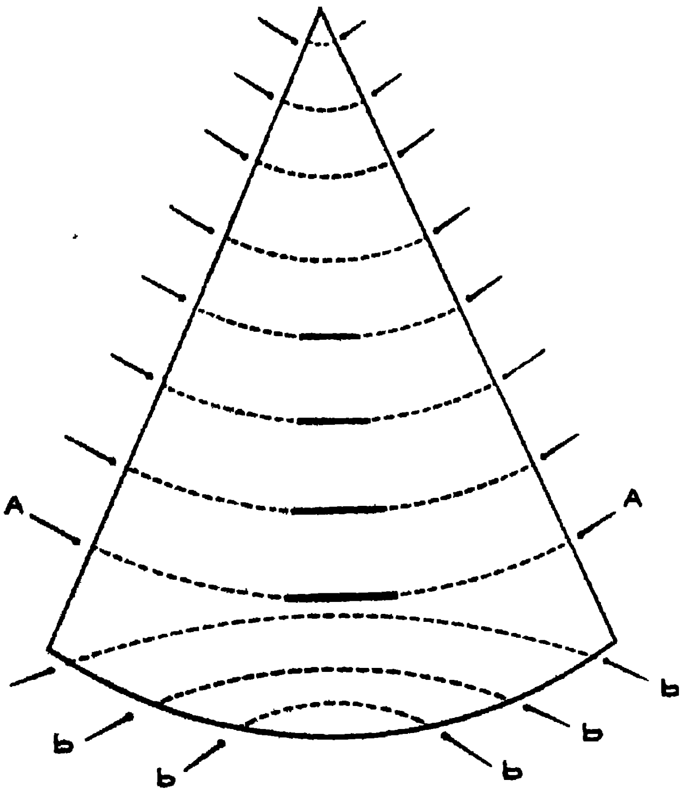


Fig. 99.—Insertion of sutures. *A, A*, intravaginal sutures; *b, b*, external sutures. (After Hegar.)

Where the laceration has been so extensive as to involve not only the pelvic floor, but also the sphincter ani and the recto-vaginal septum, there is all the more call for the immediate operation, and the procedure is proportionately more complicated. It is, above all things, important to bring together the torn ends of the sphincter ani, for otherwise the woman will suffer from incontinence of fæces to a greater or less degree, and will, in consequence, inevitably require the secondary operation. In this operation we still prefer the silk-worm gut for suture purposes. It holds just as well as silver wire, and is a source of less discomfort to the woman. The first stitches to be inserted are the rectal. The needle is inserted below the margin of the tear and is carried deeply outward so as to grasp the torn ends of the sphincter. It circles around the recto-vaginal septum and emerges at the opposite side, grasping the other end of the sphincter. As a rule, two sutures are requisite to secure the sphincter-muscle, and when inserted these may be tied. The laceration of the pelvic floor is then repaired according to the method just described.

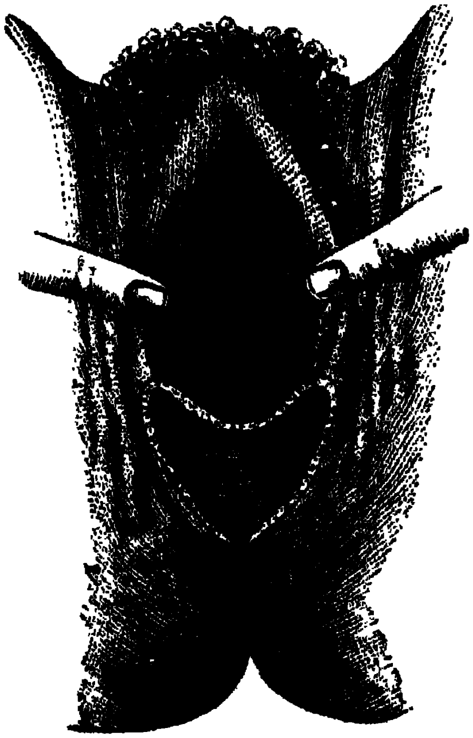


Fig. 100.—Laceration through the sphincter. Sphincter-sutures in place.

Exceptionally, the laceration occurs directly through the perineum, giving rise to what is termed central laceration. In case of this accident, the method of procedure consists in converting the central laceration into a complete, by slitting through the bridge of tissue remaining between the laceration and the pelvic floor, and then repairing the lesion after the method described.

If the steps of the operations just described are aseptic, the management of the puerperal state does not differ materially from the normal. It is unnecessary to administer vaginal douches, since the non-septic lochia will not interfere with union. The old-time rule of keeping the bowels constipated is not deemed good practice to-day. The comfort of the puerpera demands that the intestinal canal should not be allowed to become clogged, and the perineal tear is more likely to heal from the depths if we take precautions to prevent hardened fæcal matter from collecting in the rectal *cul-de-sac*. It is a good rule, therefore, to order a saline laxative within twenty-four hours after delivery, and thereafter every day, so as to secure copious liquid evacuations. The coaptated surface may be kept powdered with iodoform, aristol, or boric acid, and the nurse should be strictly enjoined to exercise scrupulous cleanliness of the external genitals. For the first few days the woman had better be catheterized, or else, and this we prefer, when she passes water it should be under the administration of a weak creolin or bichloride douche. It is very questionable if the normal urine will interfere at all with primary union.

In the event of the primary operation proving a failure, the woman should be advised to submit to the secondary operation as early as may be, for the longer she waits the greater the cicatricial tissue, and the more aggravated the rectocele and possibly the cystocele which will form.

FISTULÆ.

Only exceptionally, nowadays, are fistulæ of the genital tract encountered, for the reason that their chief causes are not allowed to act. Protracted labor was formerly responsible for the majority of fistulæ. Traumatism, except in the presence of a major degree of pelvic contraction when surgical interference was demanded, was rarely a causative factor. It is only when a fistula forms as the result of surgical interference that the physician, in the capacity of accoucheur, will be called upon to perform immediate operation. The fistulæ which result from prolonged pressure of the fœtal presenting part on the pelvic floor rarely make themselves evident until a number of days after labor. The process is purely one of sloughing in these latter instances. Of course, here, as well, it is eminently necessary to take measures for repair of the lesion as soon as the condition of the woman will allow, since the formation of extensive cicatrices will render the operation most difficult and the result problematical.

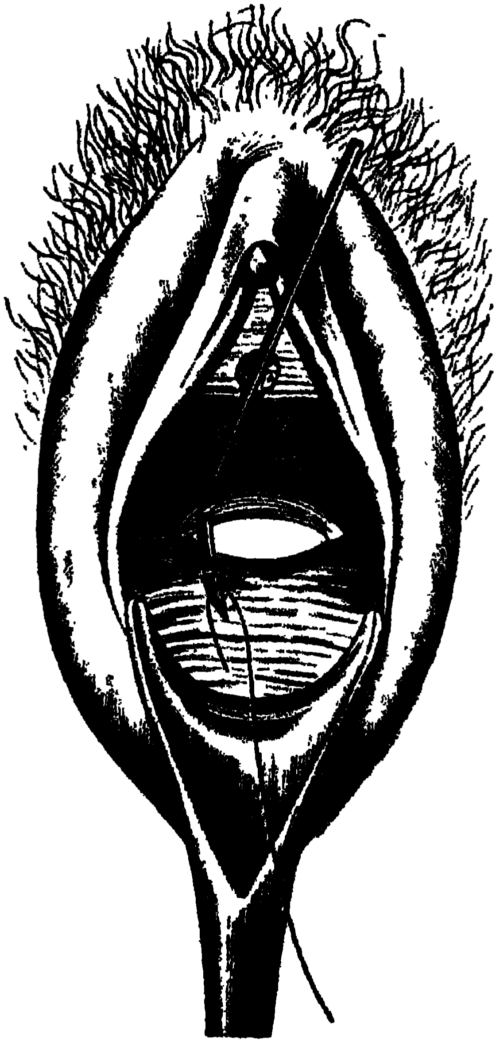


Fig. 101.—Repair of a vesico-vaginal fistula.

In view of the difficulty of the secondary operation for fistula, it may at first sight seem useless to attempt repair immediately after delivery. When we remember, however, the untoward sequelæ of both urinary and fæcal fistulæ, and the repeated attempts which are often requisite before union can be secured after the secondary operation, there is little need of dwelling further on the desirability of aiming at primary union. The main reason why the primary operation is difficult is the impossibility of placing the recently-delivered puerpera in the best position for performing the operation, particularly when the fistula affects the bladder. This, indeed, will prove a distinct contra-indication when the fistula is seated high up; but when the lesion is low enough down to enable the physician to bring it into view without placing the woman in the genu-pectoral position, the attempt at primary repair should always be made. Rectal fistulæ may ordinarily be exposed with less difficulty than the vesical.

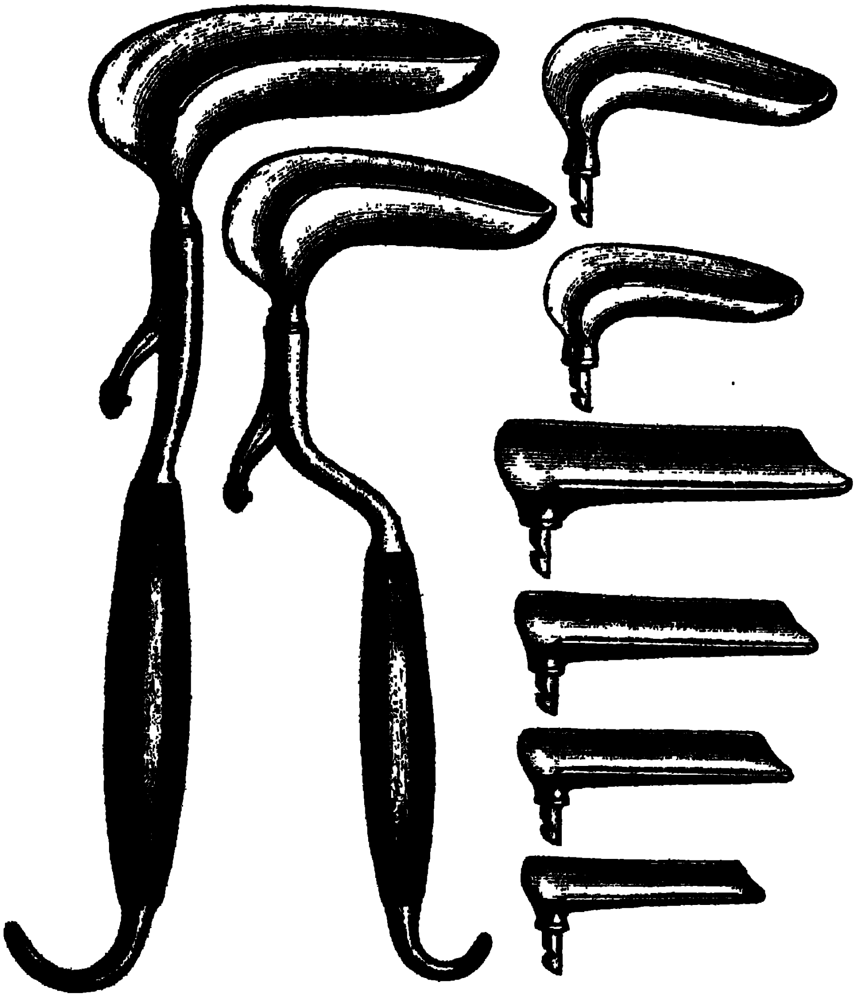


Fig. 102.—Simon's specula.

The steps of the operation either for rectal or vesical fistulæ do not differ from those requisite for the performance of the secondary operation. To prevent the lochia from trickling down and interfering with the field of vision, it suffices to pack the upper portion of the vagina with sterilized gauze. Since there is no cicatricial tissue and, consequently, no special tension to be overcome, silk-worm gut will answer for suture purposes.

If the fistula is at all accessible with the woman in the dorsal position, the edges are made tense by traction with a tenaculum, and the sutures are inserted one after another from one edge of the fistula out at the other. The same care is requisite, as in the secondary operation, not to pass the stitches through the vesical wall. Coaptation of the torn edges must be accurate and the stitches must be tied more tightly than in the secondary operation, because when any œdema present has disappeared the stitches will otherwise become relaxed.

The after-treatment will not differ from that of the normal puerperium. The bowels should be kept fluid, and where the lesion has involved the bladder the catheter should be passed at least every six hours for three days. As is the rule for the puerperal state, the catheter must be passed by sight, and this is preceded by careful disinfection of the external genitals and the vestibule. If the sutures be aseptic they will not suppurate, and they should be left in place for fully two weeks. Should the primary operation fail, the woman should be advised to have the secondary operation performed without overmuch delay.

RUPTURE OF THE UTERUS.

Rupture of the parturient uterus constitutes one of the most fatal as well as most alarming of the obstetric complications. There is scarcely an emergency which calls for more rapidity of judgment and of action; for, as will be noted, on prompt differential diagnosis and equally prompt treatment the life of the woman depends. The accident, fortunately, is an infrequent one, and will become all the more so as the benefits of strictly elective obstetric surgery become uniformly recognized.

The etiological factor cannot be always positively determined. In many instances rupture may be traced directly to the premature and injudicious administration of ergot; again, the causal factor is the attempt to drag a fœtus through a pelvis where attention to the ordinary rules of pelvic mensuration will teach that delivery by one or another method is alone possible; further, a by no means infrequent factor has been protracted labor with consequent thinning of the lower uterine segment; and, finally, the operation of embryotomy through a greatly contracted pelvis may be associated with rupture of the uterus. In certain instances none of these factors can be held responsible when, in default of a better reason, we must consider that the uterus has become weakened at a certain point, and has simply given way at the point of least resistance.

There are two varieties of rupture of the uterus, and on their differentiation depend both the prognosis and the treatment. These varieties are complete rupture and incomplete rupture.

The complete rupture is intraperitoneal; the incomplete rupture is extraperitoneal. The clinical history will ordinarily enable the physician to differentiate the variety of rupture, and the importance of accurate differentiation will shortly be apparent.

Incomplete rupture of the uterus may occur into either of the broad ligaments, or into the utero-vesical space, or into the *cul-de-sac* of Douglas. In any case the tear does not extend into the peritoneal cavity.

Complete rupture of the uterus necessarily invades the peritoneal cavity associated with, in general, the escape of the fœtus in part or in whole into this cavity.

In incomplete rupture the shock is less and the loss of blood is limited by the capacity of the cavity into which it is effused.

In complete rupture with extrusion of the entire fœtus into the peritoneal cavity the shock is great, and the hæmorrhage which may take place is only limited by the amount of blood the patient has to lose. Where a portion only of the fœtus is extruded, the amount of blood lost may be checked by the part of the fœtus which is not extruded acting as a tampon.

The signs which lead to diagnosis of rupture of the uterus are like those which are associated with hæmorrhage. These signs will vary in intensity according as the hæmorrhage is sudden and great or slow, even though gradually progressive. Shock, rapid pulse, pallor, sighing, eventually syncope,—such are the symptoms which should awaken the keen anxiety of the physician. The only positive way of making the differential diagnosis between complete and incomplete rupture is to insert the hand into the uterus, excepting, of course, in those instances where the fœtus escapes into the peritoneal cavity, when, so to speak, the diagnosis is made for us.

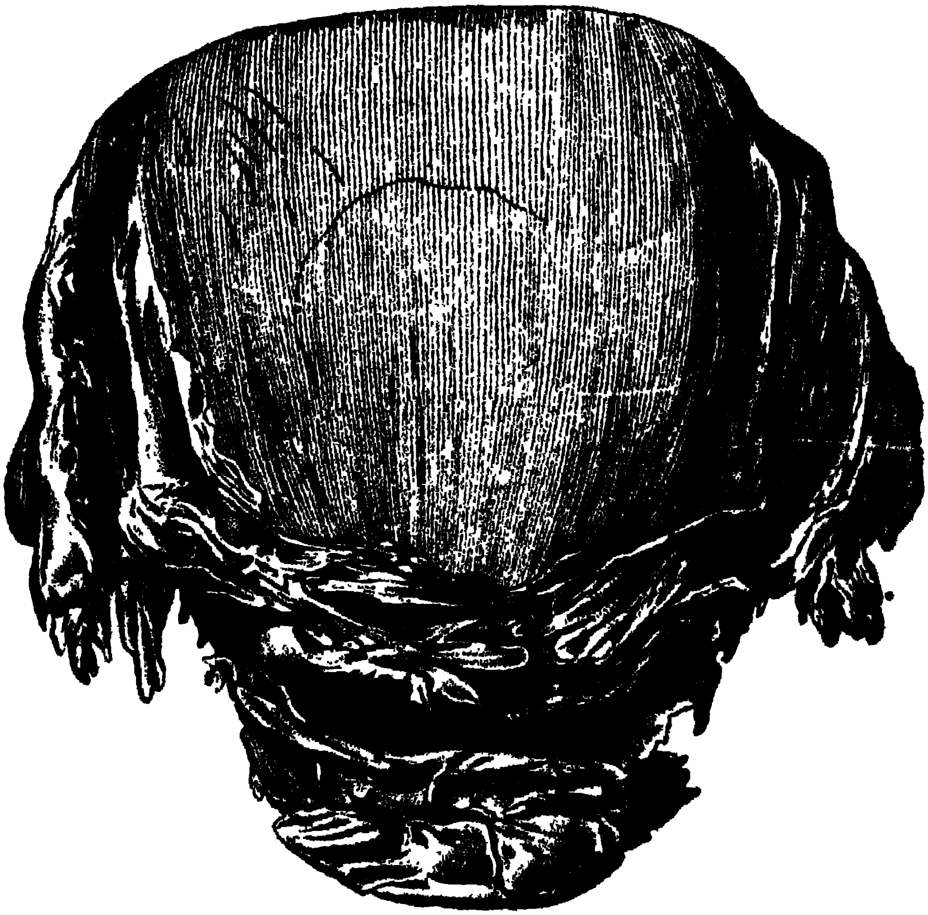


Fig. 103.—Transverse rupture of the uterus.

If the rupture is incomplete, surgical treatment is not demanded, certainly at the outset. The proper course to pursue is one of expectancy. Where the rent extends from the angle of a lacerated cervix into the base of the broad ligament, the hæmorrhage, in great part, comes from the circular artery, and this may be checked by carrying a suture around the artery and tying it. Where the rent involves the broad ligament or the anterior or the posterior *cul-de-sac*, the firm tamponade with sterilized gauze may check the hæmorrhage and limit its extension. Often, however, the blood will continue to be effused until it has dissected the cellular tissue as far as its anatomical boundaries in the given region will allow. In other words, the condition becomes one of hæmatoma—ante-uterine, retro-uterine, or lateral—into the broad ligament. Later on, if the hæmatoma do not become absorbed, or if, through some faulty technique, suppuration set in, surgical interference may become necessary. Where the rupture is intraperitoneal the prognosis, in any event, is most gloomy. If the fœtus has escaped entirely or in greater part into the peritoneal cavity, the only possible operation is an abdominal section, not in the hope of saving the child, but in order to give the woman a single chance of life. There is no time in this emergency for special preparations. The physician must have the courage of his convictions; he must open the abdomen at once, extract the fœtus, and treat the uterine rent by sewing it up after the manner pursued in the Cæsarean section, or by removal of the entire uterus as is described under the Porro operation.

Where the rupture is complete, but the fœtus has not escaped into the peritoneal cavity, there is scope for difference of opinion as to the proper treatment. The results from either of the methods which may be selected are the reverse of brilliant, although possibly of late years one of them has seemed to modify the prognosis for the better. At first thought, immediate emptying of the uterus and abdominal section would seem to be the desideratum. The fact is, however, that the woman, being in deep shock, abdominal section is simply superadded shock, and the wonder is when any recover. The alternate method is to rapidly extract the fœtus and then to tampon the uterus with sterilized gauze; we thus compress the bleeding-point and perhaps check further loss of blood. Of late years a few cases treated after this fashion have recovered. If we are fortunate thus to check the hæmorrhage, the peritoneum will take care of the blood which has escaped within it; and if the labor has been conducted aseptically and the gauze inserted is aseptic, then, if the woman do not die of shock, she will not die of sepsis. Resort to this method of tamponade is, however, only possible where the intestines have not protruded into the rent. If this has occurred, we cannot use the tamponade, because of the uncertainty as to whether or not the gut is strangulated at the uterine rent or through compression by the gauze. There can be no choice of procedure in case of intestinal prolapse; the physician's only recourse is abdominal section.

In case of incomplete rupture, where the tampon has been applied, the gauze should be left *in situ* for from thirty-six to sixty hours. Adjuvant treatment consists in raising the foot of the bed, bandaging the extremities, giving strychnia in large doses hypodermically ($^1/_{10}$ grain every two hours, for its stimulating effect on the heart), and administering hot 2-per-cent. saline rectal injections.

A further and very rare form of uterine rupture is what is termed "annular rupture." This consists in separation of the cervix at the utero-vaginal junction, either in whole or in part. The treatment requisite is ligation of the circular arteries in the event of their being implicated in the rent.

We next pass to the consideration of the puerperal affections due to septic infection which may require surgical aid. A point to be noted is that elective surgery is peculiarly applicable to these affections, since early treatment of this nature very frequently spares the woman results of the most untoward character.

ENDOMETRITIS AND METRITIS.

These affections are considered together because the one is the direct consequence of the other. On the prompt recognition of a septic endometritis depends the safety of the tubes, ovaries, peritoneum, and not infrequently the life of the woman. There has been, of late years, a radical change in the method of treatment of septic endometritis. The practice long in vogue, of repeatedly irrigating the uterus, has been found utterly inefficient as a means of guarding against infection of the Fallopian tubes, and thence of the peritoneal cavity. Whilst occasionally, when the local infection is slight and superficial, the repeated douche suffices to limit and to check the extension of the process, we are never in a position to state definitely what cases will yield to this method, and, seeing that the aim is to check the septic process *in ovo*, so to speak, treatment of a more radical nature is favored by the majority of obstetricians, particularly since it may be definitely stated that such treatment, whilst most efficient for good, carries with it absolutely no risk to the patient when properly and aseptically performed.

The objections to which the douche is open are the following: No matter how often the douch is administered, all that it can accomplish is to wash the superficies of the endometrium. The germs at work on the surface are rendered inert, but those in the depths are not affected. To attempt to check a septic endometritis in this way is very much like trying to quench a fire by sprinkling water on it at intervals. Further, since the douches are always administered with the addition of some antiseptic, usually the bichloride of mercury, there is imminent risk of poisoning the woman, as numerous cases on record prove. Again, each additional manipulation to which the woman is subjected carries with it the risk of additional septic infection. Lastly, the repeated douche entails disturbance of a sick and nervous woman, and this is bad for the *morale* so necessary for convalescence from any affection, in particular where the disease is septic infection, when the aim of all therapeusis is to support the heart. For these cogent reasons the repeated douche has been given up by practically all accoucheurs. The following method, varied in only insignificant detail, has been substituted. On the appearance of fœtor of the lochia, which, as a rule, is the precursor of developing septic endometritis, a vaginal douche is ordered, to certify to the fact that the fœtor is not due to a vaginal source. If the fœtor persist an intra-uterine douche is administered, to exclude the presence of clots or loose fragments of decidua in the uterus. If the fœtor then persist the time for action has come; for it must be borne in mind that, as yet, there may be no marked constitutional disturbance, such as chill or elevation of temperature, or even much elevation of the pulse-rate. *Whenever possible the manipulations about to be described should be preceded by digital examination of the interior of the uterus,* since not infrequently the symptoms awakening our suspicion are due to the retention of a piece of placenta which is beginning to necrose, or to portions of the membranes left behind. As a rule, it is not necessary to anæsthetize the woman; but if she is hyperæsthetic or peculiarly nervous, it is better to do so in order to lessen shock, as also in order to enable the procedure to be properly performed. The instruments necessary are a dull and a sharp curette with long handles, a vulsellum, a pair of intra-uterine packing-forceps, and a uterine irrigating-tube. A speculum is not strictly requisite, since the manipulations may be performed along the finger,—a practice necessary where the pelvic floor has been repaired. Thoroughness being requisite, however, the physician should never hesitate to sacrifice the restored pelvic floor, if necessary, in order to carefully explore the uterus.

Since it is desirable to avoid disturbing the woman as much as possible, we will describe the operation of curetting the puerperal uterus without the aid of the speculum. As a rule, also, we much prefer to use the sharp curette, since when the uterine mucosa is diseased it is absolutely essential to remove it in its entirety; for thus alone can we certainly eradicate the disease process and avoid a repetition of the operation. The risk we subject the woman to is slight compared with that she runs if the operation be not thorough. This risk is perforation of the uterus. If requisite care be used this risk is slight; still, it is desirable to have the friends of the woman distinctly understand that the procedure is not a minor one.

A fountain-syringe connected with a glass irrigating-tube or with a double-current intra-uterine catheter, and filled with a solution of 1 to 8000 bichloride of mercury, should be suspended within reach, and a pint bottle of peroxide of hydrogen should be opened. The hands of the operator, the instruments, and the external genitals of the woman should be thoroughly cleansed; the woman is brought to the edge of the couch and her legs are flexed on the abdomen. At the period of the puerperal state, when the manipulations about to be described are indicated, the cervical canal is open so that precedent dilatation will not be necessary. Again, whenever there is anything remaining in the puerperal uterus or whenever a septic process exists, the same state of the canal will be found. The index finger of the left hand is introduced into the vagina and placed at the external os. Along this finger the curette is guided into the uterus, absolutely no force being used, until the loop of the instrument reaches the fundus. If digital examination has revealed the presence of a portion of retained secundine or placenta undergoing degeneration, the instrument is guided to this and firm traction on the handle will remove it. Whilst the left hand is manipulating the handle of the curette, the right hand grasps the fundus of the uterus through the abdominal wall and not only controls it, but is ever conscious of the action of the curette. Herein lies a further value of the method of curetting without the speculum.

Where the entire endometrium is involved in the necrotic process, the curette, ever under the control of the external hand, should be made to traverse it, particular care being taken to explore the openings of the Fallopian tubes into the organ. When satisfied that the process is thoroughly eradicated, the curette is withdrawn, the irrigating-tube or the catheter is inserted, and the uterine cavity is washed out, the antiseptic solution being at a temperature of about 115° F. When the fountain-syringe is empty, the peroxide of hydrogen is poured in and the uterine cavity is washed out with this. The catheter is now withdrawn: a strip of sterilized gauze, about two inches wide and eighteen inches long, is grasped by the packing-forceps and carried into the uterus, the greater portion of the gauze being inserted. The object of this gauze is to keep the uterine canal patent for subsequent treatment should this prove necessary. The gauze is not inserted to act as a drain; indeed, if packed in too firmly, or left in too long, instead of draining away the discharges they are dammed in.

As a rule, considerable depression follows these manipulations where anæsthesia has not been resorted to, and, therefore, it is generally desirable to use it. The gauze is left *in situ* about thirty-six hours, when, after renewed asepsis of the genitals and with aseptic hands it is removed. The uterus is irrigated with hot 1 to 8000 bichloride, or with 2-per-cent. creolin, and a second strip of gauze is inserted. If the curetting has been thorough it will rarely be necessary to repeat it; the local septic process is either at an end or it has extended to the parenchyma of the uterus, giving rise to a metritis, or to the tubes and ovaries, resulting in a salpingitis or an oöphoritis. It is to avoid these untoward complications that it is essential to recognize a septic endometritis early, and to treat it radically after the manner just described.

Whilst the method of curetting through the speculum is not favored by us, since it is indorsed by many, we deem it essential to describe it. The additional instruments requisite are a speculum and a vulsellum forceps. If the operator prefer the Sims speculum, the woman is placed, of course, in the left lateral position, otherwise the Edebohls or the Simon speculum will answer for the dorsal position.

After due asepsis the cervix is exposed through the speculum, the vulsellum is made to grasp the anterior lip of the cervix, and the curette is inserted by sight instead of by touch. The manner of curetting is exactly similar to the process just described.

This topic of uterine curettage is a very debatable one. In recent years there has occurred marked reaction from the prevalent custom of curetting every puerperal uterus on the supervention of symptoms irrespective of determination as to whether or not the uterine cavity was at fault. Too frequently the first step is curetting or douching, and yet neither may be called for, and may be the source of harm instead of good. Therefore stress is laid on the absolute need of accurate diagnosis secured through digital examination of the interior of the uterus before either the curette or the douche is countenanced. Where the uterus contains neither remnant of placenta nor membranes, when, to the touch, necrosis of the endometrium is not apparent, the curette should not be used, but the source of the symptoms should be sought for elsewhere.

After thorough curettage, instead of irrigating the cavity with peroxide of hydrogen, packing with gauze saturated in 95 per cent. alcohol has yielded good results.

Frequently, after the curetting, the woman has a chill; but, as a rule, this has no significance, being entirely nervous in character. If, after the lapse of thirty-six hours, the temperature fall and the pulse approximate nearer the normal (and this fall of the pulse is the chief good omen), the chances are that the operation has been timely and that the woman has been spared extension to the parenchyma of the uterus or to the tubes and ovaries. If, on the other hand, the septic phenomena become intensified, then the physician must suspect extension, and his position must become an exceedingly alert one. A suppurative metritis or salpingo-oöphoritis can be met in only one way, and this is through abdominal section. Even then the prognosis is most gloomy, since septic processes of this nature are ordinarily associated with deep systemic lymphatic absorption,—an affection against which our therapeutic resources, both medical and surgical, as yet avail but little. If, however, there should be reasonable doubt as to the systemic infection, the physician must not hesitate, but proceed to the one operation which offers the woman a single chance of life, and this is abdominal section with extirpation not alone of the purulent appendages, but also of the septic uterus. This seems a forlorn hope, and so it is; but the sole alternative in these aggravated types of sepsis is to allow the woman to die of septicæmia emanating from the uterus or the appendages, and this course of action is reprehensible, seeing that sometimes, although very rarely, even such desperate cases recover under the bold use of the knife.

Unfortunately, septic metritis, salpingitis, and oöphoritis, when developing during the puerperium, are of such a virulent type and the associated general systemic infection is so profound that we can expect but one result, no matter what the therapeusis, and this result is death. The women die not so much because of the local lesions as because of the deep systemic infection. Still, since there are now and then recorded cases where aggressive surgery has resulted in ultimate recovery, in a given case the physician is bound to take into consideration the advisability of resorting to abdominal section. The steps of the operation are similar to those which are called for when total hysterectomy is performed for other causes. The object of the operation being to remove from the body the source of the systemic infection, ablation of the involved organs must be thorough; that is to say, the abdominal cavity having been opened, the entire uterus with the appendages must be removed in accordance with the steps which are laid down in modern treatises on gynæcology.

It is proper, however, that a note of warning should be sounded here, since, in some of the reported cases of puerperal hysterectomy, it is open to doubt whether such radical procedure were called for. It is no credit to the operator if, after hysterectomy, a necrotic piece of placenta is found in the uterine cavity, which has been overlooked because digital exploration did not control the ineffective curettage. Furthermore, where the septic process tends to localization,—that is to say, where systemic lymphatic dissemination is not marked,—whilst the symptomatology may be very aggravated, cure with intact uterus, tubes, and ovaries has over and again resulted. Perhaps no problem more difficult of solution in operative obstetrics is offered than this one of when hysterectomy is indicated. When such is the case rarely is the diagnosis established early enough for the radical operation to be of avail.

As a rule, there is associated with metritis and septic appendages the next subject we are called upon to consider:—

PUERPERAL PERITONITIS.

In considering this affection from a surgical stand-point it is essential to note the change in practice which the last decade has witnessed, without, however, it must be confessed, any special change in secured results. It is a fact beyond dispute that, no matter what the form of treatment employed, the vast proportion of cases of puerperal peritonitis die. Large doses of opium, saline catharsis, abdominal section,—each of these approved methods has an exceedingly high mortality percentage. It must be remembered that puerperal peritonitis, whether local or general, is due to infection by one or two routes, aside from instances when peritonitis complicates the puerperal state, due, we will say, to rupture of an ovarian or tubal abscess or to a purulent appendicitis. The two modes of infection are either by direct extension from the uterine cavity or by lymphatic absorption. In the former instance the peritonitis is likely to be and to remain local; in the latter instance it is likely to become general. The systemic infection is by no means so exaggerated, as a rule, in local as in general purulent peritonitis. In general peritonitis the affection is secondary to general systemic infection. Not alone is the peritoneal cavity filled with multiple abscesses, but the lymphatics of the entire system are gorged with the infectious element and deposit it all over the body. The women die no matter what the form of treatment employed, not because of the peritonitis, but because of the deep general systemic infection. It is absolutely essential, therefore, to endeavor to differentiate local from general purulent peritonitis. Frequently this is possible; then, again, the symptomatology of the one suggests the other. The physical signs may be as aggravated, frequently more so, in instances of local as in cases of general peritonitis. And yet, no matter how extremely unfavorable the case may appear, sometimes speedy surgical action reveals a local instead of a general peritonitis, and sometimes the women recover.

So important is the factor of diagnosis that every means should be utilized toward reaching the *desideratum*,—a differential diagnosis between local and general peritonitis. Examination of the uterus with the finger to exclude septic focus there; palpation of the appendages, particularly by rectum, and, in case of doubt, with the assistance of deep surgical anæsthesia,—these and every other means should be used to clear the scene.

Notwithstanding all these differential diagnostic means, there are a certain proportion of cases where the physician will still remain in doubt as to whether he is dealing with a local or with a general peritonitis. Then, in remembrance of the fact that, if the affection be local although simulating general peritonitis, the woman's chance of life depends, in all probability, on his speedy action, gloomy as is the prognosis, it is his duty to resort to the single therapeutic measure which affords a gleam of hope. It must never be forgotten that surgery is full of surprises, and that our finite methods of diagnosis must often be supplemented and aided through resort to most desperate measures.

Local peritonitis presents itself under two forms,—as extraperitoneal and as incapsulated intraperitoneal. The latter, however, is really extraperitoneal in the sense that it is shut off from the general peritoneal cavity by adhesions, being originally intraperitoneal. Etiologically the true extraperitoneal exudate, which may suppurate is not usually associated with tubal or ovarian infection, whilst the latter form is generally the sequela. This is the main reason why a true cellular abscess carries a less grave prognosis than the intraperitoneal and yet extraperitoneal variety. The symptomatology of true pelvic abscess—that is to say, of abscess in the pelvic cellular tissue—may be as aggravated in type as the intraperitoneal form; and yet the outcome of surgical treatment is much more favorable. Whenever the local and the general symptoms point to the existence of pus in the pelvic cellular tissue, the sooner it is evacuated the better. As a rule, the point of election for operating will be the vagina, since it is here that an abscess of this character usually points.

The operation is performed as follows: Thorough asepsis of the external genitals having been secured, under the guidance of the aseptic finger in the vagina an aspirator-needle is plunged into the softened exudate at a point close to the cervix, in order to avoid injuring the ureter. Along this aspirator-needle, as a guide, a narrow-bladed knife is passed and the opening into the cavity is enlarged. A steel-branched dilator is next inserted, and the opening is torn wider. The finger is then inserted into the cavity, and the different chambers which frequently go to make up the cavity are broken down. The cavity is then irrigated with bichloride or creolin solution, and next washed out with the full-volume peroxide of hydrogen or with alcohol (95°). A T-shaped rubber drainage-tube is then inserted, and through this the cavity is washed out daily until suppuration is at an end. If the cause of the symptoms has been the cellular abscess, in twenty-four to thirty-six hours the general weakened condition of the woman will have altered materially for the better, and as soon as she has thrown off the general sepsis she will rapidly convalesce.

Such is the treatment and such is the course of events in pure cellular abscess, which, we repeat, may present as aggravated symptoms as the intraperitoneal variety. Rarely these cellular abscesses do not point in the vagina, but above Poupart's ligament. Then the point of election for incision is at this site. The cavity is entered by an incision parallel to Poupart's ligament, is washed out after the same fashion, and, where possible, a counter-opening is made into the vagina, since thus we obtain better drainage, and, therefore, speedier convalescence.

It is the intra-extraperitoneal variety of abscess which gives the most trouble, both from the diagnostic and the therapeutic stand-point. General purulent peritonitis, being an epiphenomenon of general septic infection, has as yet proven rebellious to every therapeutic measure. The woman dies not because she is suffering from peritonitis, but because she is deeply poisoned. The post-mortem findings explain this. Not only does the peritoneal cavity contain multiple abscesses, but the venous and lymphatic systems are similarly gorged. What then, it may reasonably be asked, is the use of surgical procedure? Because, as we have already stated, the symptomatology of local peritonitis sometimes is suggestive of general peritonitis, and, therefore, abdominal section, even though the case appear of the most desperate type, may reveal a local peritonitis amenable to treatment. It must further be remembered that peritonitis, associated with purulent appendicitis, may complicate the puerperal state, and here prompt section may result in the saving of life. In this desperate disease one must have the courage of strong convictions, and operate, even though the battle seem lost before action. We are absolutely assured that nothing is to be gained from therapeutic nihilism, at any rate.

The abdominal cavity is opened in the usual way, and, if we are fortunate enough to find a local peritonitis instead of a general, the abscess-cavity is emptied, is washed out with peroxide of hydrogen (full strength), and is packed with sterilized gauze. If, however, the peritonitis is general and purulent, then the most we can do is to break up the multiple abscess-cavities as far as we can detect them, repeatedly flood the peritoneal cavity with hot sterilized water, and pack the lower part of the pelvis with gauze. In these cases the median abdominal incision is not alone sufficient, but multiple incision is requisite—as in the loins, in the subhepatic, and subsplenic spaces—downward into the vagina, and after repeated flushing with hot (115° F.) normal saline (90 grains to the quart) solution multiple gauze-packing is resorted to. In addition to stimulant treatment,—such as strychnia pushed to the physiological effect, whisky or brandy in large doses, nutrient enemata, etc.,—attempts must be made to restore intestinal peristalsis and to keep the kidneys acting. The repeated flushing of the colon with hot salt water will materially assist, and, although positive opinion is not, as yet, justifiable as to distinct value, the antistreptococcic serum (Marmorek) should be boldly used. Most diverse views are held in regard to the use of this serum in puerperal infection, and the reason is that ordinarily we are dealing with infection of a mixed type, against which the serum cannot be effective, or else the infection is saprophytic, when timely resort to such operative measures as have been described renders resort to the serum unnecessary. Such has been the nature of many recorded cases. Where the clinical picture is of the gloomy character offered by typical lymphatic sepsis no wonder that, like drowning men, we clutch even at straws, and hence alone the reason why we commend the serum. It *may* do good; it cannot harm.

The alterations in the symptomatology which may follow the injection of the serum are elsewhere noted. If pulse-rate is lowered, if diuresis is established, certainly in so far the woman's condition is improved, and through repetition of the dose (15 to 30 cubic centimetres) we may very exceptionally tide her along until the system throws off the poison. If the woman recover, the result is fairly miraculous. If she die, the physician has the satisfaction of knowing that he has done his full duty by his patient and that the result was in no sense due to surgery.

Puerperal Mastitis.

In the light of our present knowledge puerperal mastitis must be considered as due to infection. The germs or infectious material gain entrance through the lacteal ducts and cause the inflammatory process which may be aborted or which may suppurate.

In the latter event we have the affection which is termed mammary abscess. Two varieties of mammary abscess are to be differentiated,—the glandular and the subglandular. The former is not specially uncommon; the latter is exceedingly so. The one is readily recognized; the other is not, running an insidious course and undermining the gland often before its presence is made sufficiently known to call for the recognized treatment.

Whilst much may be accomplished in the way of aborting suppuration through the use of the ice-bag, or, if the individual prefer, by hot applications, as soon as the physician is sure of the presence of pus, the earlier it is evacuated the better for the welfare of the breast. Glandular abscess ought to be recognized early; the reverse holds true in case of the subglandular variety. And yet this latter form is the one which always eventually does the most damage to the glandular tissue, and, besides, subjects the woman to the serious risk of perforation into the pleural cavity before there exists at times sufficient evidence of pus to justify incision. In these obscure cases, when, under the use of ice or heat, the cardinal symptoms of inflammation do not abate, exploration with the aspirator-needle should be resorted to. Of course, this aspiration should be strictly aseptic, otherwise a non-suppurating exudation will be converted into a suppurating.

When the aspirator-needle reveals pus, or when there is evidence of pus without aspiration, the sooner the gland is incised the better. The line of incision should be radiating from the nipple outward, in order to avoid injuring more of the lacteal ducts than are already involved in the suppurative process. The affected breast should be scrubbed with soap and water, then with 1 to 8000 bichloride solution, and finally washed with sulphuric ether. With a clean knife an incision is made through the gland down to the abscess-cavity. When this has been opened, the finger is inserted in order to break up all the cavities into which the abscess is apt to be divided. After thorough irrigation with bichloride, the full-strength peroxide of hydrogen is poured in and the cavity is packed with sterilized gauze. A firm compression-binder is applied. At the end of twenty-four hours the dressing is removed, the cavity is again irrigated, a gauze drain is inserted, and a large sterilized sponge is placed over the breast. A firm binder is applied over all. This method of compression secures close apposition of the abscess-cavity walls and prevents the further pocketing of pus. In the event of there being no evidence from the side of the pulse and the temperature of septic absorption, this second dressing need not be changed for a number of days, when the cavity may be found entirely closed.

In more complicated cases, where, for instance, a submammary abscess has not been recognized in its early stages, the pus may be found to have dissected the entire gland, and then all attempts to save the lacteal ducts are futile. As many counter-openings as are necessary, in order to secure efficient drainage, must be made, and every possible effort is requisite to prevent the pocketing of pus under the pectoral muscle and toward the pleural cavity.

As the principles of asepsis—as applied not alone to the maternal breast, but also to the infant's mouth before it is applied to the breast—are understood by nurses and exacted by physicians, mammary abscess will become one of the rarest complications of the puerperal state. In large maternity hospitals, where the strictest care is required, the fact is that mammary abscess is now rarely met with, and, when it is, the nurse has been at fault, unless the mother has handled her breast with unclean hands.

CHAPTER XX.

ECTOPIC GESTATION.

The subject of ectopic gestation is of prime interest to the general practitioner, for the reason that on his ability to recognize the condition *early* depends usually the life of his patient. Seeing that the majority of obstetric work falls within the province of the general practitioner, it seems appropriate that ectopic gestation should be considered from its therapeutic side in a work dealing with obstetric surgery.

We shall not enter into a discussion of the value of electricity in the treatment of ectopic gestation. This agent has met the fate of other suggested measures, such as puncture of the sac, injections of morphia, etc.; that is to say, has fallen into disrepute because of its uncertainty, because of the risk to which it subjects the woman, and because the accepted pathology of to-day teaches that there should be but one method of treatment and this the surgical. It is granted that by means of electricity the ovum may be killed, but even with this accomplished the woman is not out of danger from hæmorrhage or sepsis, and, further still, whilst temporizing with electricity hæmorrhage may occur or may even be progressing. Therefore with but few exceptions the most passionate advocates of electricity in the past have admitted error, and become equally positive in teaching the surgical treatment of ectopic gestation.

We shall consider this subject from the now generally accepted view that primarily all ectopic gestations are tubal. About the tenth week rupture of the tube occurs in one of two directions: (1) into the general peritoneal cavity; (2) into the broad ligament. In the latter event the gestation may or may not continue to term.

The surgery of ectopic gestation, therefore, envisages the subject from these stand-points: 1. Before tubal rupture. 2. After rupture (*a*) into the peritoneal cavity; (*b*) into the broad ligament. 3. During development to term. 4. At term and after term.

Essential to any treatment is accurate diagnosis. Before tubal rupture this will rarely be possible beyond strong hypothesis. At the time of rupture the symptomatology will ordinarily establish the diagnosis. During development to term and at term the diagnosis is often in doubt, not as to whether pregnancy exists, but as to whether it be uterine or extra-uterine. After term, if the precedent history be clear, the diagnosis is established; but often it may be made only on abdominal section.

Before rupture—that is to say, before the tenth to twelfth week of gestation—the diagnosis may be reasonably predicated on the following history: A period of amenorrhœa, associated especially with the reflex disturbances of pregnancy, followed by irregular hæmorrhages. This hæmorrhage is highly suggestive, because, in the presence of symptoms of pregnancy, hæmorrhage means something abnormal. Ordinarily there is a history suggestive of precedent disease of the uterus and appendages, and, as a rule, the woman has never conceived before or there has been a period of protracted sterility. On local examination (vaginal and rectal) the uterus is found enlarged, and one or the other tube as well (either *in situ* or posterior to the uterus). The woman, furthermore, often complains of sharp attacks of abdominal pain, which are the associates of the distension of the tube, or are due to peritoneal irritation from tearing of the peritoneal covering of the tube. This *ensemble* of symptoms should at once awaken the suspicion of the existence of tubal gestation. In particular should the colicky pains cause anxiety, for often they are associated with rupture.

The symptoms of rupture vary according as the accident occurs into the peritoneal cavity or into the broad ligament. Accurate differentiation is essential, since there is but one possible line of action in the former event, and this is abdominal section as soon as feasible. The main symptom is collapse of varying degree, with the formation of a tumor in case of rupture into the broad ligament. Where the rupture is intraperitoneal, the symptoms suggestive of hæmorrhage (fainting, sighing, rapid pulse, increasing pallor) are usually more grave than where the rupture is extraperitoneal. The reverse may hold, however, since the intraperitoneal bleeding may be gradual and the extraperitoneal profuse. The precedent history, however, and the immediate symptoms should certify to the diagnosis almost always so as to lead to the adoption of the proper therapeusis, which is immediate abdominal section in case of intraperitoneal hæmorrhage, and expectancy in case of broad-ligament hæmorrhage. In doubtful cases examination under anæsthesia should be the rule, and preferably with everything ready for immediate section should the diagnosis be certified. Where doubt still exists, if the presumption is in favor of ectopic, a clean cut is safer than expectancy.

It should never be forgotten that in doubtful cases we can reach a diagnosis by means of an incision made in the posterior vaginal *cul-de-sac.* Such incision made under stringent asepsis carries no risk. If primary rupture have occurred, the presence of free blood in the pelvis certifies to the diagnosis and in exceptional instances the ruptured tube, with its ovary, may be removed through the vaginal incision. Should the condition prove, on examination through this incision, to be other than an ectopic sac, similarly the pyosalpinx or ovarian abscess may be removed.

The symptomatology of ectopic gestation after primary extraperitoneal rupture may be self-suggestive as regards diagnosis, and again may be very obscure. So long as the fœtus is alive, the hearing of the heart-sounds and the perception of movements will certify as to pregnancy; but, usually, short of exploration of the uterus, normal gestation cannot be excluded. After fœtal death, whilst the precedent history will suggest the likelihood of ectopic gestation, abdominal section alone, in the vast majority of cases, will clear the diagnosis.

The following conditions may simulate intraperitoneal rupture or ectopic gestation: Abortion, dysmenorrhœa, rupture of some abdominal organ with escape of its contents into the peritoneal cavity, and pelvic peritonitis.

The following conditions may be mistaken for extraperitoneal rupture of ectopic gestation: Intraperitoneal rupture of the same condition, hæmatoma of the broad ligament from other causes, exudate in the cellular tissue of the ligament, and cyst of the broad ligament or abscess within it.

In both series of instances, attention to the history and careful physical examination, if need be under an anæsthetic, will often clear the diagnosis. Peritonitis may be excluded by the elevation of temperature, which exists, usually, from the outset. Exploration of the uterus, together with careful bimanual, *rectal* and *vaginal,* will exclude abortion, aside from the fact that shock rarely exists in the latter condition, except the woman be hyperæsthetic and hysterical, when it is never deep and progressive, but transient. In case of rupture of some viscus, such as the appendix vermiformis, with escape of its contents, where the depression is extreme, the therapeutic indication is the same as for rupture of a tubal pregnancy into the peritoneal cavity. The formation or the presence of a tumor in one or the other broad ligament, no matter what the condition, will lack the urgency calling for immediate surgery. Finally, there are instances where combined uterine and extra-uterine gestation exist, and here, no matter how refined our diagnostic aids, the question can alone be settled by exploration of the uterus, and, in the event of supposed intraperitoneal rupture, by abdominal section.

The diagnosis of ectopic gestation having been made with sufficient exactitude to swerve the judgment of two or more physicians in its favor, the woman must be regarded as subject to a greater risk, according to the period of gestation. The ovum is a parasite of ill omen to its mother, and its destruction or removal is called for when, by so doing, the immediate or the ultimate safety of the woman so requires.

Prior to tubal rupture, it was formerly contended, when the diagnosis is always uncertain arrest of the growth of the ovum by means of galvanism or of faradism is justifiable. Absorption of so small a mass as the ovum is prior to the eighth or tenth week is perfectly possible, and, if this absorption should not occur, the woman at best is carrying a diseased tube, which at any time when it seems desirable may be removed by abdominal section. To-day, however, no such middle ground can be tolerated. Rarely can the diagnosis be reached before rupture, and even so rupture may at any moment occur, and therefore the immediate and future welfare of the woman is best secured through resort to abdominal section. The steps of the operation are the following: The abdomen and the pubes having been shaved and the integument having been cleansed by thorough scrubbing with soap and water, followed by 1 to 1000 bichloride solution, the woman is anæsthetized. The bladder is emptied. The instruments (scalpel, artery-forceps, ligature-carrier, Peaslee-Hagedorn needle) should be thoroughly sterilized, and the hands of the operator and of his assistants should be scrupulously cleansed. It must be remembered that septic infection is the sole risk the woman runs in the hands of an operator familiar with the technique.

Fig. 104.—Cleveland's ligature-carrier.

The operation is likely to prove of shorter duration if the woman be placed in the Trendelenburg position. This position may be improvised by tying an ordinary kitchen-chair to the table so as to form the inclined plane. (See page 502.)

In addition to the instruments, the operator should have prepared at least four large, flat, gauze pads and one dozen small gauze sponges. A few gallons of hot (110° F.) sterilized salt solution should be ready to irrigate the peritoneal cavity, in the event of threatened collapse from unavoidable hæmorrhage. The peritoneum rapidly absorbs the salt solution, and it forms our readiest restorative.

The usual incision is made down to the peritoneum, about three inches in length, extending upward from above the pubes.

Any hæmorrhage is checked by torsion of the small vessels. Before opening the peritoneum the operator should emphasize his injunction that absolutely no antiseptics are to be used in the further progress of the operation.

The peritoneal cavity having been entered, one or more of the large gauze pads, wrung dry from the sterilized water, are inserted to keep the intestines from the abdominal opening. With one or two fingers the operator liberates the tube and ovary (if adherent) and brings them out of the abdominal incision. The ovarian artery being very vascular, it is desirable, when feasible, to isolate it and tie it separately with medium-sized sterilized silk. The pedicle is transfixed by the ligature-carrier; a stout, sterilized, Chinese-silk ligature is brought through, the ends are crossed and firmly tied, after the usual manner. The appendages are then removed.

The tube and ovary of the opposite side are next examined, and, if diseased, are similarly tied off.

The pads are now removed from the abdominal cavity. If the operation has not been associated with hæmorrhage, it is not necessary to mop out or to irrigate the field of operation. In case the pulse is flagging, however, irrigation with salt solution should be resorted to.

The abdominal incision is closed by deep silk-worm-gut sutures, transfixing all the tissues and including carefully the fascia of the recti.

In the event of the woman not being seen until tubal rupture has occurred, the surgical treatment must be immediate if the hæmorrhage be intraperitoneal. True enough, the chances are the woman is in deep shock, possibly in collapse; but, since the cause of the shock is hæmorrhage, to delay operation simply means intensification of the shock. The condition is one requiring considerable strength of character for proper decision. The chances are that the woman will die if not operated upon; the rapid opening of the peritoneal cavity is hardly likely to add to the shock, whilst we thus alone can check the hæmorrhage. It appears proper, therefore, to advocate immediate operating, irrigating the bowel with hot salt water meanwhile, or injecting it directly into the cellular tissue of the back or chest. The steps of the operation are similar to those just stated, except that, on opening the peritoneal cavity, no time should be lost in grasping the ruptured tube and tying it off, for this is the source of the hæmorrhage. The peritoneal cavity should then be irrigated with hot, sterile salt solution to act as a restorative and to wash out the major portion of the blood and clots. What must perforce be left behind the peritoneum will take care of, unless it be septic. Where this possibility is feared, drainage by gauze through Douglas's *cul-de-sac* is preferable to attempts at drainage through the abdominal incision.

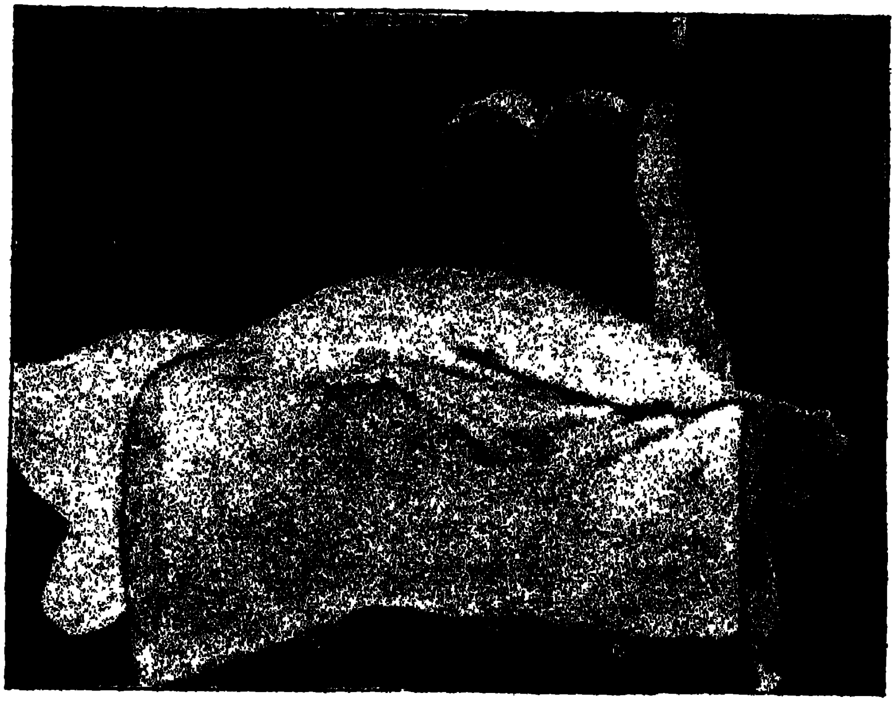


Fig. 105.—Emergency Trendelenburg posture. (The inclined plane is formed by an ordinary chair being tied on a kitchen-table.)

When the diagnosis of rupture into the broad ligament (extra-peritoneal rupure) has been reached the therapeusis should be *strictly expectant; operative treatment is rarely called for.* If the woman be kept in the *recumbent position until the hæmatoma be-*

comes smaller, but little other treatment will be necessary, beyond the self-suggestive means for meeting the greater or less acute anæmia from which the woman is suffering: such as frequent hot water (115° F.), saline (1 per cent.), rectal irrigation, strychnine hypodermically ($^1/_{20}$ grain every two to three hours), etc. Rarely the blood-clot breaks down into pus from septic infection. An opening should then be made into the sac from the vagina. The pus must be thoroughly evacuated, the sac washed out with the full-strength solution of peroxide of hydrogen, and drainage resorted to.

In a small proportion of cases the ovum survives the extra-peritoneal rupture and continues to grow. The woman from now until term is in constant danger from the possibility of secondary rupture into the peritoneal cavity. Every day the increasing size of the child and of the placenta adds to the danger of this accident. The life of the woman alone is to be taken into consideration. The chances that development will continue and the child reach full term are small, and even if it should, and be safely removed, it rarely survives the first few weeks, and is rarely, also, perfectly formed.

Inasmuch as the continuous growth of the child constantly increases the danger which the woman must encounter, it is the duty of the physician to destroy it as soon as it has been determined that development is taking place. If development has continued beyond the fourth month, the death of the child will not increase the woman's safety. The sac may have formed adhesions with loops of intestine, and through this source sepsis may have entered the system. In such cases it is necessary to carefully watch the woman, and, as soon as any symptoms of sepsis are apparent, abdominal section is to be performed. These symptoms are chills, remittent temperature, rapid pulse. The sac is to be opened, the decomposed fœtus is to be removed, and the opening of the sac is to be stitched to the abdominal wall. Usually the placenta will have become freed from its attachments and may be removed at the same time. Should in fragments. Free drainage should be maintained. Usually this operation will be practically extraperitoneal.

If the child has reached full term and is alive, a very interesting complication calls for decision. The little notoriety which one gains from performing a brilliant operation should not influence the conscientious physician for a moment. Neither must sentimental notions carry the least weight in reaching a conclusion. The question to be decided is the following: "Should I operate and possibly save the life of the child, which at best will stand but few chances of surviving, and by so doing greatly add to the dangers of the already-unfortunate mother; or should I delay the operation and thereby permit the child to die and the placenta to lose very much of its vascularity, if, indeed, not all of it, and by this delay very much enhance the chance of recovery of the woman?" To those who will look at this question purely from the stand-point of the woman, and who will consider, as they ought, the ectopic fœtus as simply a parasite, the choice will unquestionably be in favor of delay. No one will deny the legitimacy or the imperative necessity of resorting to fœticide in the non-controllable vomiting of pregnancy, with the end in view of saving the woman. The belief of Tait, that those who advocate the killing of the child in developing extra-uterine pregnancy are simply "abortion-mongers," is illogical, and must be looked upon as one of those statements which are made in haste and are not retracted owing, possibly, to false pride.

After the child is dead and the placental circulation has ceased, operation carries far less danger to the woman. It is contended by some that no operation should be performed until symptoms supervene, but nature's tedious methods of relief and the many obvious dangers to which the woman must be exposed do not seem to justify non-interference. The abdomen should be opened as soon as the placental circulation has ceased (and this is certified to by the absence of placental murmur), the fœtus is removed, and the sac is stitched to the abdominal wound. If the placenta is detached and lying free it should be removed, and the sac is drained and allowed to close from the bottom. If the placenta is adherent, no attempt should be made to free it, for it will come away gradually through the abdominal opening. Convalescence is hastened if a vaginal opening can be made at the same time and through-and-through drainage thus established.

Under the modern method of treatment we have outlined, ectopic gestation has been practically robbed of its terrors, and the almost absolute mortality-rate of the past has been converted into the almost certain recovery-rate of the present. Once again is the value of election in obstetric surgery certified.

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